

MARINE REVIEW.

VOL. XVI.

CLEVELAND, O., AUGUST 26, 1897.

No. 9.

Service of Lake Newspapers.

Few people realize the importance of service rendered to shipping interests by newspapers of the principal cities of the lakes. This service has grown with the commerce of the lakes, and it is no small item of cost with the newspaper managers. It has been systematized to a degree fully equal to advances made in other matters pertaining to lake commerce. Only a few years ago the reports of vessel movements in daily newspapers were confined to the passages at Detroit. Gradually Port Huron, Mackinaw and other places were added and then the arrivals and departures at various ports were taken up, until there is now one central bureau of marine information, the Lake Marine News Association of Chicago, serv-

of newspaper work, enabled Homer J. Carr of Chicago, the central figure in the group, to establish the association referred to above. He is its manager and is ably assisted by Fred D. Curtiss, whose newspaper training was also secured in Chicago. Mr. Carr developed a reputation for the Chicago Tribune in Marine matters some years before undertaking the establishment of the lake news bureau, but he is probably no better known to marine men than John Chamberlin of Buffalo or Louis Bleyer of Milwaukee. Mr. Bleyer belongs to a family that is well known in Milwaukee newspaper circles. His marine column has been a feature of the Evening Wisconsin of that city for years. He has the advantage of a practical knowledge of the vessel business, which he secured when an owner of vessel property some years ago. John Chamberlin has been connected



JOHN CHAMBERLIN,
Buffalo Enquirer.

R. D. WAGSTAFF,
Detroit Free Press.

HOMER J. CARR,
Lake Marine News
Association.

FRED D. CURTISS,
Lake Marine News
Association.

LOUIS BLEYER,
Evening Wisconsin,
Milwaukee.

W. A. LIVINGSTONE,
Detroit, Mich.

Marine Representatives of Lake Newspapers.

GEO. V. CALLAHAN,
Cleveland Plain Dealer.

ing nearly all of the newspapers of the lakes on a mutual basis. This association, maintaining correspondents in all parts of the lakes, conducts a telegraph business involving thousands of dollars each year, all of it borne by the newspapers for the benefit of lake interests.

But aside from the regular run of vessel movements, accidents, etc., collected by this news agency, the leading daily papers of Chicago, Buffalo, Detroit, Cleveland and other places employ men who are in many instances specially suited to preparing and discussing a great variety of information that is of value to vessel owners. A group of these newspaper representatives is presented in the accompanying illustration. Some of them have spent a great number of years at this work, and are well known to vessel owners, not only in their own homes, but in all parts of the lakes. There are other bright young men on lake newspapers whose efforts would entitle them to a place in this group, but the illustration was made hurriedly from such photographs of the older men in the service as the Review had at hand. Business tact, combined with a full knowledge

with Buffalo newspapers for sixteen years and during all that time has kept in touch with the vessel business. He was the marine editor of the Buffalo Express for twelve years. Mr. Chamberlin is a graduate of Cornell and is capable of engaging in all kinds of editorial work on newspapers, so that his labors have extended to correspondence, largely relating to business subjects, for several of the leading papers of the country. R. D. Wagstaff of the Detroit Free Press is a Buffalonian by birth. He has been writing for newspapers during the past eight years, having been engaged on the Detroit News, Atlanta Constitution, New York Morning Advertiser and Detroit Free Press. A likeness of Mr. W. A. Livingstone of Detroit is included in the group on account of his interest in the preparation of statistics pertaining to lake commerce and the contributions he has made to literature of the lakes. George V. Callahan of the Plain Dealer, Cleveland, has held the position of Marine reporter on that paper for eight years and has made a reputation for reliability, which is of most importance in news relating to business matters.

Abuse of the Passenger Privilege.

Editor Marine Review:—

It appears to be anomalous, but it is nevertheless strictly true that most vessel owners will hail with satisfaction the effort now being made by the United States revenue cutter officials in the "Soo" river to prevent the carrying of passengers on unlicensed freight craft. Every vessel owner is sadly conscious of the abuse of such passenger privilege, and yet as an individual owner or manager he has felt himself powerless to correct it. He was, in a sense, obliged to do what others were doing or incur the ill will of those seeking to ride on his boats. True it was a violation of law to carry them, but as the law was never enforced, there was no risk of fine. True, the freight steamers were not equipped with the facilities for safety in case of accident beyond the needs of the crew, but that made no difference—the passenger was willing to take his chances.

Many vessel owners have much desired that a sufficient excuse could be had to enable them to decline all requests of would-be passengers. There are some whom they would always have been pleased to carry, but the enormous abuse of privilege is what staggers them and creates the desire to cut off the whole business. Relatives of the manager, and of the master and of each stockholder or joint owner, even to the forty-second cousin, feel somehow that the boat is under obligation to carry them. Persons with whom the manager of the boat is scarcely acquainted, and not under any more obligations to carry around than he would be to carry Queen Liliuokalani, very frequently apply for a trip "up the lakes." Then the shippers and consignees of the cargoes carried by the boat frequently request accommodations for their families and friends on the ground that they are justly entitled to them. The following will serve as a representative example:

The steamer———had just completed a round trip carrying up coal at 20 cents to Duluth and ore back at 50 cents. The agent of the coal company that loaded him, came to the manager of boat and said: "My son and daughter would like to go around on the next trip and they have six young friends they would like to take along—only eight in all—Shall I send them aboard?"

A shadow passed over the manager's face. His heart sank within him. He had just figured up the last trip and found he was in debt \$32.28. The coming trip was to be made at the same rates of freight. He thought of the larger provision bill and of the necessary efforts of the captain and crew to entertain them, but his extra rooms had not been spoken for, and he could only reply: "Yes, send them aboard."

The coal man was a prominent shipper and he did not want to incur his displeasure by refusing. The manager knew that an agreement to carry, involved an obligation to entertain them. The yawl boats with some of the crew to man them would often be brought into requisition on their account, while at the "Soo," as has often happened, the boat would possibly be detained waiting for its passengers. While the boat was waiting to lock and in locking through, they would go ashore and in an electric car "do up" the beautiful town of Sault Ste Marie. Or they would sit on the bank, even while the boat was losing time awaiting their return, steeped in forgetful reverie, while they listened to the soothing music of the rapids. The manager was mad all over, as he contemplated what was involved in the promise he had just made. He was in a fighting mood and it was well that no one happened to cross his path at that moment.

"Damme!" he said, "Why don't the revenue cutter fellows fine us and stop this violation of law."

A Vessel Owner.

Cleveland, Aug. 25, 1897.

The Glasgow School.

Editor Marine Review:—

I read your journal weekly with great pleasure, as it gives me news of American friends and their doings, which is interesting to one who has received so much kindness from Americans. Your remarks about the Glasgow School of Naval Architecture are most flattering, but I can not allow to pass unnoticed one in your number of July 29, namely, that "the Glasgow school is not of the kind that furnishes the higher order of technical training suited to our young naval constructors." With such teachers as Lord Kelvin, Professors Ferguson, Barr and Jack, there need be no reasonable limit to the amount of technical training of the higher order. My own experience as a student of the Royal Naval College at Greenwich enables me to say that if students desire "the higher order" they can get it at Glasgow. The difficulty is that American students generally prefer to spend the time at their disposal in acquiring practical technical knowledge, and seem to leave the "higher order" to a very limited number who have the genius for ready absorption and application of high science, and who appear very rarely in our school. The Royal Naval College course is one laid down for students connected with the naval service, and must be rigidly followed by all students. The Glasgow course is that of a university in which men may take what classes they choose, unless they wish to take degrees. Very few naval architecture students elect to do the work necessary for a degree, preferring to spend their time almost completely upon naval architecture or marine engineering, and to leave alone more general subjects, and those of a "higher order in technical training."

J. H. BILES,

Glasgow, Aug. 14, 1897.

Canada and the Lake Trade.

Although the present government in Canada seems to be making every effort to complete the system of St. Lawrence canals within the next two years, thus providing 14 feet navigation from Lake Erie through to Montreal, it is the opinion of well informed vessel men on the lakes that this improvement, when it becomes a reality, will be of no great advantage to the Dominion in increasing its proportion of the grain trade from the northwest to the Atlantic seaboard. This opinion is based on the great reduction that has been made in carrying charges on grain shipped from the northwest to the seaboard by way of Buffalo. Vessels of 6,000 tons capacity and channels already affording about 18 feet draft have combined to reduce the lake freight to such a low figure that there would be no fear

of serious competition from the St. Lawrence route if the canal system over that route, with its limit of 14 feet draft, was immediately available. But increased elevator capacity and lower elevator charges at Buffalo in the near future are assured, and it is certain also that a further reduction in transportation charges from Buffalo to the seaboard will be secured upon the completion of Erie canal improvements now under way and which involve an expenditure of \$9,000,000.

The prediction that Canada's 14-foot canal project, so long under way, would when completed prove inadequate in competition with the Buffalo route, seems verified, therefore, in the opinion of vessel men on this side, and it is also quite evident that the present government in Canada realizes the necessity of having something more than a canal of limited dimensions if they are to secure the portion of the lake trade which they have been so long seeking. This is proven by a recent correspondence in one of the Montreal papers between Mr. Tarte, minister of public works, and President Van Horne of the Canadian Pacific Railway, concerning the export trade in Canadian wheat by way of Montreal and by way of New York. The correspondence opens with a question by Minister Tarte why so much of the traffic of the Canadian northwest has gone to American ports instead of by way of the Canadian Pacific company's railway and steamship lines to the Canadian seaboard. President Van Horne, in reply, says, the reason of the traffic going by the New York route is the very simple one that for most of the time it is the cheapest by way of the lakes and canal. New York has another advantage in the low ocean rate, due to the use of very large vessels especially adapted to the carriage of freight at the lowest possible cost, no such vessels being found in the Canadian Atlantic service. Until such ocean vessels are employed to supplement the Canadian railway and canal system, and there is complete separation of the passenger and heavy freight carriage, he holds that the vast expenditure of Canada on her canals and railways will largely fail of their object.

In answer to this letter, the minister of public works has outlined a plan for remedying the disadvantage under which the Canadian system now competes with the American route. He says Montreal has not one single modern elevator, nor one cattle yard worthy of that name, while the American ports are well equipped with modern elevators capable of doing an immense business, and other facilities that make the handling of trade easy and cheap. He would at once set about equipping the harbor of Montreal so as to make it a cheap port. "The question," he says, "is not whether we will have one wharf more or less. This is really of no importance. We must apply ourselves to building permanent elevators and cattle yards, to the further deepening and widening of the channel of the St. Lawrence, to also completing our telegraphic system to the Straits of Belle Isle, so as to allow the largest vessels to come through our waters and give the Canadian people the benefit of the great expenditure they have incurred to secure the trade of the northwest and of the western states. That trade nature has destined for us, and we should not spare any effort to bring forth that result." Minister Tarte thinks that as Canada has given large subsidies to the Canadian Pacific and the Parry Sound railway companies and has built and is completing an expensive system of canals to bring to its ports the western trade, the time has come when it should reap the advantages of the enormous outlay for which the credit of the dominion has been pledged. But if the judgment of well-informed vessel men now in control of the lake trade proves correct, the scheme of great terminal facilities at Montreal here outlined by Mr. Tarte will be of no avail, as the canal system itself will give to Canada little more of the lake trade than that country has at present.

A Submarine Wrecker.

Another submarine vessel has been launched at the ship yard of the Columbian Iron Works, Baltimore. The inventor, Simon Lake, does not expect to revolutionize modern methods of naval warfare, but he is putting quite a large sum of money into a vessel which he intends to apply to wrecking work, including the exploration of the bottom of rivers, lakes, bays and even seas. The cigar-shaped hull of the vessel has two big iron wheels attached to it near the bow. The edges of the wheels are corrugated like those of a cog wheel. A smaller wheel of a similar character is attached to the boat at the stern. The wheels are intended to enable the vessel to run along over the bottom of rivers and other bodies of water, the propeller of the vessel supplying the necessary motive power. The boat will be so arranged that divers can pass in or out of the vessel while she is on the bottom of rivers. The boat is 36 feet long and 9 feet in diameter, built of steel and strongly ribbed to resist the water pressure. She is propelled, when on the surface, by a gasoline engine of 30 horsepower. She can also be propelled, while on the bottom, by the same engine, the air supply being obtained through a hose leading to the surface and supported by a float. She can be propelled along the bottom by an electric motor as well, taking current from a powerful storage battery. Searchlights are mounted on the bow and sides. Her speed is estimated at 8 miles an hour on the surface and about 5 miles on the bottom. She will have fuel carrying capacity for a run on the surface of about 2,000 miles.

The crew will consist of a captain, an engineer and four divers. It is claimed that one man can handle her if necessary.

Buffalo Elevator Capacity.

In the last issue of the Review, John Chamberlin, a Buffalo correspondent, criticized an article published a week previous, in which a grain blockade at Buffalo during the closing week of the season was predicted. The Review has made further inquiry in this regard and we are still of the opinion that before the season is at an end serious delays will be encountered by vessels taking grain to Buffalo. We are also of the opinion that Mr. Chamberlin is wrong in saying that Buffalo has had but one grain blockade. The worst in the experience of vessel men of the present day was that in the fall of 1891, but there has been more or less of a blockade at Buffalo every fall since, notwithstanding there has been a little increase in elevator capacity in the meantime. Last fall very many vessels suffered serious delay for want of elevator room. It is true that Buffalo has one new elevator in operation this season, the Export, but its capacity is only a quarter of a million bushels. There are two large steel elevators being built, but neither of them will be ready for service before November, and most likely they will not be ready for service this season.

Salvage Money for Assisting Disabled Vessels.

Owing to the high salvage money obtained by rendering assistance to a disabled ship at sea, many steamers and sailing vessels carry on an irregular sort of "wrecking business" by always being on the alert for stranded ships. A tramp steamer that could bring a great trans-atlantic liner into port in a disabled condition would realize more money than its owner would make in a trip across the sea with a full cargo. As an illustration of what salvage money is paid for towing steamers into port, mention can be made of a few conspicuous cases. In 1882 the City of Richmond was towed into Halifax harbor, and cost her owners \$35,000 in salvage money. In the same winter the City of Boston broke her shaft at sea, and her owners were compelled to pay a bill, for towing and other aid, of \$46,500. When the Atlantic liner Paris broke down off the Irish coast in 1890, she was towed into port at an expense of \$30,000. So rich are these prizes that the coast wrecking companies frequently send powerful tugs to sea just after a storm in search of disabled vessels. If a steamer is several days overdue, the tugs may go hundreds of miles off the coast, and in this sense the companies extend their labors into new fields, practising wrecking upon the high seas. When the fast Atlantic liner New York made her first voyage from the port of New York, she ran aground off Sandy Hook, and the owners had to pay nearly \$100,000 to float her again. One of the Red D line steamers

Water Tube Boilers.

Writing of water tube boilers for war vessels in Cassier's Magazine, Past-Assistant Engineer W. M. McFarland of the United States navy says:

"As a type, water tube boilers may be said to consist of a mass of tubes, forming the heating surface, and uniting one or more steam drums at the top with one or more water drums, or their equivalents, at the bottom, the water being inside the tubes. They may be divided into two main classes, those having tubes of small diameter and those with tubes of large diameter. To the former belong those boilers which have already made a name for themselves on torpedo boats and yachts and a few large ships—the Thornycroft, the Yarrow, the Normand, the Du Temple, the Ward, the Cowles, the Mosher, the Towne, and others—while the latter have been used mainly on larger ships and comprise the Belleville, the D'Allest, the Niclausse, the Babcock & Wilcox, and some others. In the former, the tubes are not over 2 inches in external diameter, while in the latter they are rarely less than 3 inches. In the former, the tubes, though occasionally straight, are generally curved or bent, but in the latter they are always straight. The tubes themselves are of so small a diameter that they can readily be made safe for any pressure. The drums are the largest parts and they are still of such moderate dimensions that they, also, can be made of ample strength. Even in the case of those boilers



MACLURE, MACDONALD & CO., GLASGOW, PHOTOGRAPHERS.

International Congress of Naval Architects and Marine Engineers.

From a photograph taken at Clyde entrance to ship yard of Messrs. Denny & Co., Dumbarton, Scotland.

stuck on the Brigantine shoals off New Jersey in 1889, and the wrecking company that pulled her off received \$40,000 for their services. The more recent work of floating the American line steamer St. Paul from the sand off Long Branch recalls the difficulty of hauling one of the great trans-atlantic liners off a sandbar or mud-flat. Both the Chapman and Merritt wrecking companies of New York combined to float her, and the salvage money, amounting to about \$100,000 was divided among them.—George E. Walsh in Cassier's Magazine.

The Bethlehem Iron Co. of South Bethlehem, Pa., on Aug. 12, successfully cast the first 16-inch gun ever made in this country. Over 100 gross tons of metal were used. It was heated in two 40-ton and one 20-ton furnace, which were charged beyond their capacity. The casting is simply for the tube of the gun. It is octagonal in shape, 19 feet 6 inches long, and 74 inches in diameter. The jacket for the gun, which is for the United States government, will be cast later. It will be of the same size as the tube. The company is making extensive improvements to its armor and ordnance plants, which will result in the cheapening of the cost of manufacture.

Lists of names of captains and engineers of lake ships, appointments of 1897, may be had from the Marine Review for \$1. Vest pocket size.

Erie elevators now have a combined capacity of 1,300,000 bushels.

which have water legs or sides consisting of flat, stayed plates, they can be made strong enough for any pressures likely to be used for many years to come. It may be said, therefore, that water tube boilers are adapted to any pressure that may be desired. It is well understood that the cause of the great disaster when an ordinary boiler explodes is the large amount of contained water at a high temperature, and, as already pointed out, even when the boiler itself is not injured, but a pipe is ruptured, the large mass of water continues to give off steam for a long time. In the water tube boiler, there is much less danger of rupture, but, if it does unhappily occur, there is so much less water that the only damage will probably be the scalding of the people in the immediate vicinity. In all probability the boiler itself will not be injured beyond the weak part which gave way, and can be repaired."

The Marine Review has prepared in neat oak frames cards containing the schedule of time required to be run between certain points in the St. Mary's river under the speed limit of seven miles an hour. When hung in a pilot house, distance and time may be readily noted from these cards, as the type is large. They will be sent by express to any address at \$1 each, or may be had upon application at 409 Perry-Payne building, Cleveland, for 65 cents each.

The Review has excellent photographs of lake ships.

Death of George C. Finney.

Announcement of the death of George C. Finney of Chicago, who was taken off suddenly by apoplexy last Thursday afternoon, was a surprise to vessel men. He had been visiting his farm near Ross, Indiana, and was in a carriage on the way back to the station to take the train for home when stricken. He died in a short time. Up to the time of his death he was around attending to business, apparently hale and hearty. The funeral took place from his late residence, No. 631 Cleveland avenue, Sunday afternoon at 2 o'clock. An unusually large number of old-time marine men were present to pay the last token of respect to their old friend and business associate. There were men present who had been prominent in developing the lake marine from its once insignificant proportions to its present size. The pall-bearers were Calvin Carr, J. S. Dunham, James Mowatt, John Cairns, William G. Keith and John G. Murphy. The interment was at Graceland. Mr. Finney left a widow and two sons, Harry Perkins and George Minot. The elder son, Harry, was the junior partner in the firm of George C. Finney & Co., while George recently finished an engineering course.

Coming from that group of men that developed a great vessel business on Lake Ontario, Mr. Finney first located at Oswego, N. Y. He was born in Henderson, Jefferson County, N. Y. in 1829, which made his age at the time of his death sixty-eight years. He was raised on a farm, but went to Oswego and started in ship chandlery under the name of Finney & Lyons. This was in 1855. In 1863 Mr. Finney moved to Chicago and opened a store on South Water street. Since that time the firm name has been changed from Finney & Channon, and Finney Bros., to the present title, George C. Finney & Co. In 1865 he was married to Sarah Perkins, of Oswego. Six children were born to them, but two only are alive now. Apart from his ship chandlery business, Mr. Finney has always been a vessel owner, and prominently identified with all the interests of the marine business. It is said that his sole aim was to live an honorable life. If such was the case, he died with his life's work accomplished. Not only in business dealings was this true, but in private life he was an upright man. Old acquaintances feelingly speak of him as the poor man's friend, and relate many kind acts which he did, prompted only by a generous spirit. And more frequently in aiding his fellows who were unfortunate, he heeded the injunction: "Let not thy right hand know what thy left hand doeth."

At a meeting on Saturday afternoon in the Arbitration room of the Chicago Board of Trade, called to take action on the death of Mr. Finney, Capt. W. M. Egan presided, and Capt. F. B. Higgle was secretary. The committee on resolutions, of which Capt. James L. Higgle was chairman, reported the following, which was adopted by a standing vote:

"Again marine men are called together to pay their final tribute of respect and high esteem for a departed pioneer in lake transportation and ship chandlery. The generation to which the present is indebted for the magnificent development of lake waterways is slowly passing from the field of their earnest and successful endeavor, but their works live after them. George C. Finney, whose death we so deeply deplore, and whose memory we have gathered to honor, represented in the highest degree all those elements of sterling honesty, great industry and high ability, coupled with a kindness of heart, which make men both successful in business and beloved by their fellowmen. Thoughtful and considerate at all times of the rights of others, frank and open in his character, time but ripened the friendship of his associates, years but added another bond, and when the time came when nature exacted the penalty of her law of a return to dust, these friends and associates have only loving remembrances of the comrade of a lifetime. In token of the painful regret, we, the old-time associates of Mr. Finney, feel at his sudden demise, be it

"Resolved, that we extend to the bereaved family our heartfelt condolence in their grief, and express our share in their affliction and that so far as possible the marine men of Chicago here represented attend the final services to the dead."

Lake Freight Matters.

It is quite evident from strength developed in lake freights generally during the past few days that a settlement of the strike of coal miners in Ohio and Pennsylvania would result in an immediate advance in rates and a strong market until the close of the season. But in the absence of coal shipments the market is slow of advancement, and the ore dealers, who have been making some new sales from day to day, have managed to cover them by lake freight contracts that do not represent much of an increase over the prevailing low rates. It is now more than probable that the coal shippers will be unable to move sufficient coal to meet the requirements of the northwest, but there seems to be assurance of enough grain to cause a gradual increase in freights from this time on. The general improvement in business has caused some figuring for new vessels, but negotiations as yet are only of a preliminary kind. Building will probably be confined almost entirely to steel barges.

Fines for Carrying Passengers.

The announcement from the Sault that revenue cutter officials on the river were preparing to take special measures for enforcing the law against passengers on freight vessels was not attended by regrets from vessel owners. Notwithstanding the low freights of the present season, the abuse of passenger privileges has been carried to an extreme unheard of in previous years, and the vessel owners, who have been powerless in their efforts to curb this evil, on account of circumstances that surround requests made upon them, would be pleased to hear of some of the vessels being fined. Managers of the regular passenger lines, whose business is injured on account of the general practice of carrying passengers on the freight steamers, are understood to have instituted the complaint that has resulted in the government officials taking up this matter on the St. Mary's river.

The largest furnace firms in the Pittsburg district were among late buyers of iron ore, a fact which, taken in connection with others, is an indication that the furnace practice of 1897 has tended rather to a smaller than a larger percentage of Mesabi ores than in 1896. The percentage now generally employed does not go much if any above 40 per cent.—Iron Trade Review.

Welland Canal Rules.

Prompted by recent accidents in the Welland canal, the insurance interests represented by Geo. L. McCurdy have taken measures to inform vessel masters of the regulations governing the navigation of the canal. In a letter to the Review, Mr. McCurdy says: "I find on investigation that many of the vessels using the Welland canal are without copies of the rules of the Canadian government governing navigation in Canadian canals, and after considering the matter with Captain F. D. Herriman, surveyor-general of Great Lakes Register, we have determined to furnish to every steamer running through the Welland canal a copy of sections 5, 22 and 25 of the canal rules. These three sections are to be printed on stout cardboard and the masters are requested to hang them up in the pilot-house of the steamer in a conspicuous place."

In the printed cardboard sheets Capt. Herriman says: "The following extracts from the Canadian rules governing navigation through the canals are printed at the expense of Great Lakes Register. I would respectfully suggest that these important rules be given a conspicuous place in the pilot-house or office of your steamer." The sections of rules referred to are as follows:

Sec. 5. It shall be the duty of all masters or persons in charge of any steamboat or other vessel, or of any raft, on approaching any lock or bridge to ascertain for themselves, by careful observation, whether the lock or bridge is prepared and ready to receive them, or allow them to pass through, and to be careful to stop the speed of any such steamboat or other vessel or raft with lines, and not with the engine wheel, in sufficient time to avoid a collision with the lock or its gates, or the bridges or other works of the canal and harbors, and should such collision take place, the owner, owners or masters of such steamboat, other vessel or raft, shall be subject to such fine as the superintending engineer may impose, not exceeding \$80, and shall also be held liable for any damage to the lock, bridges or other works of the canal that may ensue from such collision, such damage to be estimated by the superintending engineer of the canal, and at once paid over to the collector, paymaster or person appointed to receive it.

Sec. 22. No vessel or boat shall be permitted to pass through any canal at a greater speed than the superintending engineer may determine, which, as a general rule, may be taken as 4 miles an hour, under a penalty, for every such offense, of not less than \$20, and subject, further, to be detained at the last lock until the time limited for passing such canal shall have expired.

Sec. 25. Every vessel, boat and raft as aforesaid, shall be conducted into, through and out of every lock in a careful manner, so as to do no injury to such lock; and for every neglect of this regulation the owner or master shall pay a fine not exceeding \$20, in addition to the cost of repairing any injury that may be done to the lock or its gates, or other works of the canals.

Blue Book of American Shipping on the Coast.

The popularity of the 1897 Blue Book on the coast is quite complimentary to the publications. In past years considerable advertising was secured from the coast, and Eastern manufacturing concerns subscribed for the book for the names and addresses of ship builders, owners, masters and engineers. But this year it is having a very satisfactory sale among coast vessel owners, ship builders, and ship brokers, on account of the information of value to them which it contains.

Alfred Winsor & Son, prominent ship owners and brokers of Boston, Mass. write as follows: "We will take one of your Blue Books, and we are only too glad to be able to help you out in this matter, and trust all the ship brokers and owners will contribute their share to this matter. It is something we cannot afford to let die out."

The coast information department of the book will not die out, for in one mail, recently, there were orders from a vessel owner in Huntsport, N. S., a large ship building concern in Bath, Me., and one from a ship broker in Brunswick, Ga. Orders have come from fifteen members of the Maritime Association of the Port of New York. Three large New Orleans steamship lines have ordered copies recently, and three orders from the Pacific coast included the owner of a fleet of twenty large coasting steamers, ship builder and an engine builder. An idea of its general coast and river circulation of the book may be had from the following list of places from which orders have been received during the past few weeks: Sag Harbor, N. Y., Mobile, Ala., Handsboro, Miss., Seattle, Wash., Hawesville, Ky., Providence, R. I., Norfolk, Va., Stockton, Cal., Brooklyn, N. Y., Pittsburg, Pa., Hamilton, O., Louisville, Ky., Wilmington, Del., Washington, D. C., New London, Conn., Madison, Ind., Bangor, Me., Long Island City, N. Y., Gloucester, Mass., Bath, Me., Brunswick, Ga., Handsport, N. S., Waterbury, Conn., Reading, Pa., Cincinnati, O., East Boston, Mass., Newport News, Va., Baltimore, Md., So. Bethlehem, Pa., Cairo, Ill., Philadelphia, Pa., Highland Park, Conn., Holyoke, Mass., Hoboken, N. J., Rondout, N. Y., Perth Amboy, N. J., Tompkins Cove, N. Y., Stamford, Conn., Springfield, Mass.

The Blue Book is also on file at the headquarters of every harbor of the American Association of Masters and Pilots. D. T. Mertvago, Russian naval attaché at Washington, ordered two copies, one for his own use and one to be forwarded to headquarters of the Imperial navy.

On the big freight steamers of the lakes there is a demand for an inexpensive telephone system that will enable the captain on the bridge to communicate with the after end of the ship when making a dock or when in close quarters at any time. Such a telephone system could, of course, be used also for communication with the engine room, captain's quarters, etc. The Smith Portable Telephone Co. of No. 132 La Salle street, Chicago, is now exhibiting in Cleveland a system of telephones which can be applied to five parts of a ship at a cost of less than \$100. The outfit seems to be more reliable than anything as yet tried on the lakes.

Ship chandlers, vessel managers or purchasing agents who do not receive the 1897 block catalogue from the Boston & Lockport Co. should address them at No. 142 Commercial street, Boston, for a copy. It is complete, and all arrangements of blocks are shown. It is said to be the most complete catalogue of its kind in print.

To Prevent Collision at the Encampment.

Geo. L. McCurdy of Chicago, representing the underwriters who are interested in the so-called McCurdy-Prime syndicate, and in the publication of the Great Lakes Register, has made a straight proposition to the Lake Carriers' Association to maintain a signal service at the Encampment in the Sault river, where there is danger of collision on account of a sharp turn in the channel. Mr. McCurdy submits the matter to the vessel owners in a communication to Capt. Geo. P. McKay, treasurer of the Lake Carrier's Association, in which he says:

"Capt. F. D. Herriman, surveyor-general of Great Lakes Register, has just made a thorough inspection of the Sault river. He calls my attention particularly to the dangers to navigation at Johnson's point, Sailors' Encampment. I may say that I have had several communications from the masters of ships trading to the upper lakes, who have noted with concern the danger of collision at this point. It is at times impossible for a boat bound up to hear a down bound boat's whistle, and the point seems to be one specially marked as needing some safe-guard to be placed thereon in the interest of the lake marine. Capt. Herriman says that the suggestion that the trees on the point be cut down, would be of little value on account of the rise of the land from the end of the point, but he says that it is absolutely necessary that something be done, and that the suggestion of Capt. J. F. Vaughan of the steamer Northern Queen and Capt. C. G. Ennes of the steamer Sir William Fairbairn, that a flag be shown in the day time and a light at night, is a valuable one and should be adopted. I am authorized in the interests of Great Lakes Register to make the proposition to you, as a representative of the Lake Carriers' Association, for your consideration, and I trust approval, that the Great Lakes Register, at its own expense, will maintain such signals at this point for the balance of the season, and is ready to take steps to install them as soon as the approval of yourself and the government is secured. An endorsement from you to this effect will be met with our immediate action. The suggestion made is, that a white flag indicates to the up bound vessels the approach of a down bound steamer; underneath this is to be shown a red and white pennant should the down bound steamer have a tow. At night these signals are to be replaced by a red light for a steamer down bound, and a red light with a white light underneath for a steamer accompanied by a tow. I trust you will give this matter early consideration, and reply."

On account of the general disposition among government officials to oppose private lights, private signals, or the marking of channels in any way other than through the light-house service or regularly authorized departments of the government, Capt. McKay has deemed it advisable to first submit this proposition to Commander Folger of the light-house service, who is in charge of the Sault river district, and to Capt. Davis of the revenue cutter patrol service, who is expected to exercise authority over the passage of vessels at the point referred to. The action of Mr. McCurdy and his associates is commendable, and the proposition will be acted upon as hurriedly as possible, but it is thought best to first have a clear understanding with the government officials.

The So-called "Tidal Waves" of the Lakes.

Scientists in attendance at the meetings of the British association in Canada have been giving attention to the so-called tidal waves of the lakes. In a paper on "The Great Lakes as a Sensitive Barometer," presented by Mr. F. Napier Denison of the Toronto university, an attempt is made to explain the causes of these "water spouts," or "seiche," as they are scientifically termed. Mr. Denison's observations were taken in the shallower part of Lake Ontario, fronting Toronto, under conditions strongly resembling those at the Lake Erie ports where the "tidal waves" have been most noticed. The records show that the longitudinal and transverse "seiche" movements are very marked preceding and during storms primarily due to differences of atmospheric pressure over the extremities of the lake, but greatly augmented when the gale strikes the water surface. The mean time interval of longitudinal "seiche" is four hours and forty-nine minutes; the transverse, forty-five minutes. There is a marked agreement between the time intervals of the smaller lake undulations and those found upon the corresponding sensitive barograph traces, both showing a predominance of twenty-minute intervals.

Mr. Denison explains the smaller lake undulations as due to atmospheric waves, which are set up along the boundary surfaces of different air strata when traveling in opposite directions. The action of these atmospheric waves upon the surface of the water tends to form minute undulations, which increase in amplitude as they move into bays, where the water becomes shallower, until finally they assume the proportions as recorded upon the instrument. It was found that marked rapid and large undulations often occur during the autumn and winter months upon both instruments, when the barometer is actually rising and fine weather prevails over all the surrounding territory. The explanation is that at such times an area of low pressure, a cyclone, is situated over the south or southwestern states, which usually moves over or near to the lake region. In such cases the recorded atmospheric waves are due to the lower, denser air of the anti-cyclone moving towards the southwestern cyclone, along whose upper boundary surface huge waves, extending to the earth, are set up by the rapidly opposing upper poleward current. The mean velocity of this upper current in summer is 60 miles per hour, and in winter 110 miles per hour. On the other hand, during the approach of an anti-cyclone, attended by fine weather and westerly winds, these lake undulations become extremely small, because the lower air moves in approximately the same direction as the upper poleward current. In illustration of the direct action of these air waves upon the surface of the lake, Mr. Denison notes that on March 8 last, during the passage of several successive huge atmospheric "billows," the water rose $8\frac{1}{2}$ inches in ten minutes, then fell $10\frac{1}{2}$ inches in fifteen minutes, followed by the phenomenal rise of $11\frac{1}{2}$ inches in fifteen minutes. The information obtained from fishermen on Lakes Ontario, Erie and Huron shows that a twenty-minute interval has been frequently observed between the two or more so-called "tidal waves" that follow each other.

George H. Worthington of Cleveland, who owns a controlling interest in the schooner yacht Priscilla (cup defender), which was brought to the lakes from the coast some time ago, has authorized a New York representative to dispose of her if a purchaser can be found at a reasonable figure.

Programme of New Aids to Navigation.

Executive officers of the Lake Carriers' Association are prepared to present to the light-house board, in time for action by that body before the next session of congress, their suggestions regarding new aids to navigation on the lakes. Fortunately, the appropriations to be sought for the lakes this year will not be heavy, as no expensive light structures are proposed. The vessel owners will be satisfied with a liberal appropriation for gas buoys, which have proven so successful in lighting lake channels. In accordance with numerous letters from committees of the Ship Masters' Association and from other sources, suggesting locations in all parts of the lakes where gas buoys will prove of assistance to navigation, Capt. George P. McKay of Cleveland has canvassed the whole subject carefully and has just forwarded to the light-house board a list of these localities, graded as of "first importance," "necessary" and "desirable." Gas buoys for some of these places, where they are most urgently needed—at Starve island reef, Lake Erie, for instance—will be established before the close of the present season, but for the great bulk of the list new appropriations must be secured at the next session of congress. The list as finally forwarded to the Washington authorities is as follows:

Of first importance—Starve island reef, Lake Erie; Gull island reef, abreast of Middle island (Canadian), Lake Erie; North point, Thunder bay, Lake Huron; Middle island, Lake Huron (a light-house at this point would be preferable); St. Martin's reef, Lake Huron (a light-ship with fog signal at this point would be preferable); Five-Foot shoal, Detour passage, Sault river; Pt. au Chenes, turning point at lower end of Mud lake, Sault river; off Mission point, below Pt. Iroquois, upper Sault river; off Round island point, upper Sault river; Graham shoals, Straits of Mackinaw; Waugoshance 16-foot shoal, Straits of Mackinaw; Racine reef, Lake Michigan; off N. E. point of Squaw island, Lake Michigan; Nine-Foot shoal at "Death's Door," Lake Michigan.

Necessary—Off Charity island, Saginaw bay; Gravely point, Saginaw bay; Major shoals, Straits of Mackinaw; South Fox island, inside shoal, Lake Michigan; Boulder reef, south of Gull island, Lake Michigan; Whale-back shoal, Green bay; Peshtego shoal, Green bay; entrance to South Chicago; Grand island, east and west entrances, Lake Superior; new shoal between Kelley's island and South Bass island, Lake Erie; Rose's reef, W. by S. of Buffalo harbor; Horse-Shoe reef, Niagara river; Strawberry channel, Niagara river; head of Russel's island, St. Clair river; Chey-boygan shoal, Straits of Mackinaw; Rose's shoal, near Waugoshance, Straits of Mackinaw; Vienna shoal, Straits of Mackinaw; Outer shoals, "Death's Door," Lake Michigan; Calloo island shoal, Lake Ontario.

Desirable—Niagara river, about W. by N. $\frac{1}{2}$ N. from Green island, Lake Erie; north of Garden island, Lake Michigan; Nine-Foot shoal, Rock island passage, Green bay; Richards shoal, W. by S. from head of Beaver island, Lake Michigan; southwest end of Madaline island, Lake Superior; Port Austin reef, Lake Huron; newly discovered shoal about $1\frac{1}{2}$ miles southwest from Gray's reef light-ship; Hog island reef, Straits of Mackinaw; outer end of Hyde Park, Lake Michigan; South park shoal, off Chicago; Drisco shoal, Green bay; South Charity shoal, lower end of Lake Ontario; Seneca shoal, near Buffalo, Lake Erie; Sturgeon point, Lake Erie; east bank of St. Clair flats channel, Lake St. Clair; Pt. au Barques reef, Lake Huron; Ottawa point, Lake Huron; Reynold's reef, near Spectacle, Lake Huron; southeast end of Mackinaw island, Lake Huron; Wiggin's point, Lake Michigan; South point, Milwaukee; Flat Rock, Escanaba.

There are also a few places in Canadian waters where gas buoys would be of great advantage, but it is not expected that the United States authorities can do anything towards lighting these places. The Canadian points are: Waverly shoal, near Buffalo; shoal off North Harbor island, Lake Erie; Grecian shoal, off Little's point, Lake Erie; Grubb's reef, near Pt. au Pelee, Lake Erie; Point Abino, Lake Erie; lower end of Stag island, St. Clair river; upper and lower end of Woodtick island, St. Clair river.

With a view to assisting vessels trading to Lake Ontario it is proposed, in addition to the gas buoys for that lake referred to above, to seek an appropriation from congress for a fog signal at Thirty-Mile point, and probably for a fog signal also at the town of Niagara.

Discriminating Duties.

The question of discriminating duties involved in section 22 of the new tariff act is attracting attention from commercial bodies in different parts of the country, and the decision of the attorney general is awaited with considerable interest. This section of the new law provides that a discriminating duty of 10 per cent. ad valorem, in addition to the duties imposed by law, shall be levied on all goods, wares and merchandise which shall be imported in vessels not of the United States, or which, being the production or manufacture of any foreign country not contiguous to the United States, shall come into the United States from such contiguous country; but that this discriminating duty shall not apply to goods, wares or merchandise which shall be imported in vessels not of the United States entitled at the time of such importation by treaty or convention to be entered in the ports of the United States on payment of the same duties as shall then be payable on goods, wares and merchandise imported in vessels of the United States, nor to such foreign products or manufactures as shall be imported from such contiguous countries in the usual course of strictly retail trade. The specific question which has led to the necessity of construing this provision arose out of the circumstance that a large invoice of teas and other goods from Japan had been received at the port of Chicago over a Canadian railway. The collector of the port asked the secretary of the treasury whether the 10 per cent. discriminating duty provided for in the section referred to applied to those goods. The subject was at once referred to the attorney general, who has heard counsel representing important interests upon the question of the proper interpretation of the section. An opinion in the matter will not be long delayed.

Luce's "Seamanship" is a book that is specially suited to assist young officers of the naval reserve. It is being used by naval reserve organizations all over the country. It is a standard work, selling at \$10, and will be mailed to any address at that figure by the Marine Review, 409 Perry-Payne building, Cleveland.



DEVOTED TO LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 409 Perry-Payne building, Cleveland, Ohio,
by John M. Mulrooney and F. M. Barton.

SUBSCRIPTION—\$2.00 per year in advance. Single copies 10 cents each. Convenient
binders sent, post paid, \$1.00. Advertising rates on application.

Entered at Cleveland Post Office as Second class Mail Matter.

The books of the United States treasury department on June 30, 1896, contained the names of 3,333 vessels, of 1,324,067.58 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1896, was 383 and their aggregate gross tonnage 711,034.28; the number of vessels of this class owned in all other parts of the country on the same date was 315 and their tonnage 685,204.55, so that more than half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1896, was as follows:

	Number.	Gross Tonnage.
Steam vessels.....	1,792	924,630.51
Sailing vessels and barges.....	1,125	354,327.60
Canal boats.....	416	45,109.47
Total.....	3,333	1,324,067.58

The gross registered tonnage of the vessels built on the lakes during the past six years, according to the reports of the United States commissioner of navigation, is as follows:

Year ending June 30, 1891.....	204	111,856.45
" " " 1892.....	169	45,968.98
" " " 1893.....	175	99,271.24
" " " 1894.....	106	41,984.61
" " " 1895.....	93	36,352.70
" " " 1896.....	117	108,782.38
Total.....	864	444,216.36

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC. (From Official Reports of Canal Officers.)

	St. Mary's Falls Canals.			Suez Canal.		
	1896*	1895*	1894	1896	1895	1894
Number of vessel passages.....	18,615	17,956	14,491	3,409	3,434	3,352
Tonnage, net registered.....	17,219,418	16,806,781	13,110,366	8,560,284	8,448,383	8,039,175
Days of navigation.....	232	231	234	365	365	365

* 1895 and 1896 figures include traffic of Canadian canal at Sault Ste. Marie.

The new heads of the navy, Secretary Long and Assistant Secretary Roosevelt are said to be at work on a radical plan for harmonizing the long existing differences between the line and staff corps. A lengthy editorial in the Army and Navy Journal would indicate that the scheme embodies some excellent ideas. It contemplates nothing less than the ultimate dissolution of the engineer corps as it exists today, and the education of officers in the future in such a way as to enable them to perform equally well the duties of a navigator and those of an engineer. All officers on board ship with the exception perhaps of surgeons and paymasters will be given positive rank and with this bone of contention buried the advocates of the scheme believe that it will be adopted by congress. Prof. Ira N. Hollis is credited with having suggested to the secretary the ideas that formed the basis of the scheme. From information available, it appears that the existing conditions will not be changed. The officers at present in the engineer corps, with the possible exception of those who have just entered that branch of the service, will remain as engineers. The same is true of those who are now line officers. But it is proposed to change the course of study at the naval academy so as to give every cadet a thorough and practical knowledge of steam engineering, a knowledge which will be equal to that which is now imparted to the engineer cadets. There will be no line or engineering branch. Upon graduation the men will be assigned to duty as ensigns. They may be available for duty as deck officers or they may be assigned below at the engines. There is to be a corps of chief engineers, the members of which are to enjoy positive rank. It is said that the proposition is favored by Commodore Melville, as well as other leading members of the engineer corps, and also by the younger line officers, but the older line officers are thought to be opposed to it.

Engineer-in-Chief J. M. Wilson of the war department has issued a circular giving instructions to the officers of the corps regarding the employment of men on public works under the civil service regulations. Provision is made for the selection of temporary employes for positions where there are no eligibles or in case persons on the eligible list do not possess the requisite qualifications. Civil service local boards have been established in each engineer district. One of the largest classes of employes who require peculiar qualifications for the work are junior engineers, which grade includes inspectors, sub-inspectors, overseers, sub-overseers, surveyors, hydrographers, topographers, transitories, levelmen, sextant observers, computers, rodmen and recorders. Employes occupying any of the junior engineer positions in the classified service, for which educational tests are required, are eligible for assignment to clerical grades without examination, subject to the approval of the chief of engineers.

Investigation by the London Ironmonger into the recent purchase of American steel rails for the East Indian railway shows that English rails were offered at an average price of \$27.50 a ton, while the American bid was \$23.50. The Bengal & Nagpur Railroad Co. has placed an order with an American firm for 2,000 tons of rails at \$23. The English bid for these was \$27.25. The high price asked by the English firms is peculiar when it is considered that the London price of steel rails in July last, as given by the Economist, was \$21.78. To be sure, the price bid for the Indian rails included cost of transportation to Calcutta, but that should be less from

London than from any American port. There seems to be ground for suspicion that the English firms were bidding on the supposition that the contract must come to them anyway for patriotic reasons, and they wanted their patriotism well rewarded.—Exchange.

Few people comprehend the multifarious operations of the United States treasury. We credit it with the supervision of the mints, and the printing and engraving of paper money, stamps and bonds, but, perhaps, do not realize that it has under its control a fleet of ninety-seven vessels, or nearly as many as are in the commission of the United States navy. These are employed not only in collecting the customs, but in patrolling the coast, furnishing supplies to light-houses and light-ships, rescuing vessels in distress, enforcing the revenue and navigation laws, as well as being engaged in the coast and geodetic survey and in the service of the marine hospitals. Mr. Charles H. Hamlin, ex-secretary of the treasury, refers to these, as well as many other duties that fall within the scope of the department, in an article which he contributed to a recent number of Harper's Round Table.

Mr. Charles H. Cramp says that officials of the navy department are certainly in earnest regarding the general project for the construction of dry docks, which they propose to submit to congress at its next session. Humiliation attending the docking of the Indiana at Halifax has stirred up the whole country. Mr. Cramp is of the opinion that the next dock should be built at the League Island navy yard. He says that there are now built and building nine or ten naval vessels that can not well be docked in any existing dry dock in this country, though some of them might use the new dock at the New York Navy yard, if the latter, which partially collapsed lately, were in condition to be used.

In England as in this country the closing years of the century are distinguished by propositions that involve several gigantic engineering schemes. One of these is the project for connecting Scotland and Ireland by a tunnel. The passageway would extend from a point in Scotland just north of Point Patrick to a point on the Irish coast just west of Carrickfergus and several miles north of Belfast lake, which is an arm of the Irish sea. It would be lighted by electricity and would cost \$35,000,000. The plan is reported to have received the endorsement of engineers, and "syndicates" and "government influence" are freely mentioned in connection with the promotion of the enterprise.

The lightest known solid is said to be the pith of the sunflower, with a specific gravity of .028, or about one-eighth that of cork. The sunflower is extensively cultivated in central Russia, and various uses are served by its different parts, the recent discovery of the lightness of the pith essentially increasing the commercial value of the plant. For life saving appliances at sea, cork has a buoyancy of one to five, while with the sunflower pith one to thirty-five is attained. About 800 cubic inches of it would weigh as much as 1 cubic inch of iridium, the heaviest metal.—American Machinist.

As indicating the draft of water in the Detroit river under different conditions of weather, it may be noted that during the week ending on Saturday last the gauge used by the government engineers at Ballard's reef, where the water is shallowest, was at the following marks: Aug. 16, 17 feet 6 inches with wind north-west, heavy; Aug. 17, 18 feet, north-west moderate; Aug. 18, 18 feet 2 inches, south, strong; Aug. 19, 18 feet 1 inch, north-west, light; Aug. 20, 17 feet 11 inches, north-west, light; Aug. 21, 18 feet, south, moderate.

Rapid development of our torpedo boat fleet is probably the cause of the navy department again directing attention to the question of using oil fuel. The secretary of the navy has ordered Lieut. Nathan Sargent to proceed to the oil fields of Pennsylvania to pursue investigations along this line. It is said that plans for special machinery to be applied to one of the new torpedo boats at the Newport station will depend largely upon Lieut. Sargent's report regarding the kind of petroleum fuel that is at command.

C. P. Huntington, who is the leading spirit in the Pacific Mail Steamship Co., Newport News ship building plant and other big enterprises, is quoted as saying that he will build two 10,000-ton steamships, which, with the China and City of Peking, will enable the Pacific Mail to largely increase its business and give the quietus to threatened transpacific Japanese competition.

Forced draught, it is asserted, is very bad for boilers, but if it is, the locomotive seems to get along pretty well with it. No marine boiler was ever forced as locomotives are forced, or burned anything like the same amount of coal per square foot of grate surface.—The Engineer, New York.

All sorts of extreme statements are being made regarding the scarcity of wheat in European countries, one of them to the effect that the Russian government is meditating the promulgation of a decree prohibiting exportation, owing to the small crops in southern Russia.

George H. Bliss, whose death was announced from New York a few days ago, was an active member of the firm of John Bliss & Co., well-known manufacturers and dealers in nautical instruments. He was fifty-five years of age.

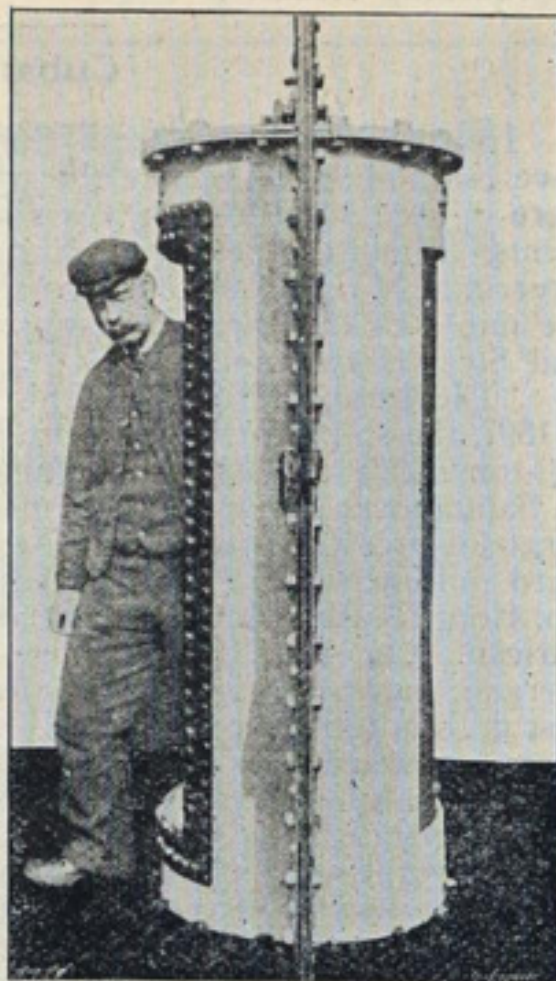
Four Thornycroft boilers will supply steam for engines of over 7,000 horse power in the torpedo boat to be built by the Harlan & Hollingsworth Co., Wilmington, Del., for the United States government.

It is more than probable that Chief Naval Constructor Hichborn will again be reappointed to his present position after the regular term of service in such capacity, which expires next month.

Contrary to what might be expected, British statistics of shipping casualties show that collisions occur more frequently by day than by night.

Revolving Bulkhead Door.

A revolving double door for water-tight bulkheads in ships, invented by Wm. Kirkaldy of Glasgow, is attracting considerable attention in naval circles. It was fitted on board the recently-built channel steamer *Duchess of Devonshire* and is said to have the approval in England of the board of trade. The distinctive feature of this double door is that it is impossible to leave it open at any time when passing through the bulkhead, one door having to be absolutely closed before the other opens. From the accompanying illustration it will be seen that the arrangement consists of a hollow cylindrical casing, which is bolted to the water-tight bulkhead, one-half of the circle being in one compartment, and the other half in the compartment adjoining. In the casing are two doorways, one at the fore part of the circle, and the other at the aft part. Within the casing, and close fitting, is a hollow cylinder, which easily revolves, having one doorway in its circumference of a size corresponding to each of the doorways in outer casing. This cylinder is suspended by a central bolt overhead, and freely revolves on ball bearings. The revolving action is accomplished, in the illustration printed herewith, by hand, slots on the outside for the insertion of the fingers, and handles on the inside, being provided for this purpose. The inventor, however, in other doors now being made, is substituting other means of revolving the door, with the view of obviating any possible risk of damage to the fingers of anyone hurriedly operating it. When it is intended to pass through the bulkhead, the aperture in the revolving cylinder is brought round to correspond with the doorway in the casing, and the person steps inside, revolves the cylinder, and in doing so, of course, brings it round so that its one doorway corresponds with the doorway on the opposite side of the casing, thus giving access into the compartment. The doorway by which entrance was had to the casing is, of course, absolutely closed before the revolving cylinder and its opening comes in line with the opposite doorway allowing egress from the casing. As the casing is bored like ordinary engine cylinders, and the inside cylinder turned to fit it like a piston, it is evident that the door is always effectually closed. The Brandon Bridge Building Co., Motherwell, are the manufacturers.



PATENT REVOLVING DOUBLE DOOR FOR WATER-TIGHT BULK HEADS IN SHIPS.

Erastus Wiman's Canal Scheme.

Erastus Wiman, who is trying to enlist capital in the building of a large fleet of canal vessels that will be specially suited to the enlarged Erie canal, is very probably encouraged by the improved condition of business throughout the country, as he is again submitting through the newspapers elaborate collections of figures suited to the advancement of his scheme. He reviews the whole subject in an interview given out recently.

"It is a fact not generally appreciated," he says, "that the Erie canal, now being enlarged at an expenditure of \$9,000,000, voted directly by the people of New York, will possess a carrying capacity for food products equal to that of the five trunk line railroads that parallel it, and, moreover, it will be competent to take care of and to handle every bushel of grain or every barrel of flour that the lake marine can deliver. Further, that while the railroads now carrying these products are exacting rates paying fixed charges on an aggregation of \$500,000,000, or equal to \$1,000,000 per mile for the distance traveled, the canal, being free, exacts no such tremendous tribute. Further, that the cost of maintenance, which to the railroads is next to that of interest, is for the canal borne by the state and in no sense can be made a charge on the products that are handled. Still further, that the cost of movement of freight by the railroads has never yet been less than 5 mills per ton per mile, while on the canal a profit is possible at a mill per ton per mile. Think of it! One ton ten miles or ten tons one mile for a cent! And yet, still further, all railroad freight passing through the harbor of New York, in or out, bears a lighterage charge of 3 cents per 100 pounds, or 60 cents a ton, equalling on a 30-ton grain car no less a charge than \$18, which either the producer or manufacturer pays, and which lighterage charges, in the harbor of New York, reach the enormous sum of \$10,000,000 annually. Canal freight bears no such charges, for, being already afloat when it enters the harbor, it can be delivered at a ship's side or to storage at any point without any cost for transfer."

Asked how it is that these advantages so striking had not before been made available and how it came that it was left for him to head the movement for this somewhat remarkable reform, Mr. Wiman replied: "In the first place, the reform now impending will come from the enlargement of the canal, all of which will be completed within a year from next May, and which, under the systematic management that I propose to inaugurate, will absolutely double the capacity of that great waterway. But the principal want hitherto has been organization, the employment of capital, the introduction of real business capacity and the lack of terminals specially dedicated to canal traffic. Heretofore individual effort by 1,500 canal boatmen, each with two or three mules, or, with a few exceptions, wretchedly poor steamboats, has been the instrumentality endeavoring to compete with such great organizations as the New York Central, the West Shore, the Delaware & Lackawanna and Erie and Lehigh Valley railroads. With no terminals of their own, with no organization, no responsibility, no corporate guarantee for a bill of lading at the point of production, this great waterway, costing \$100,000,000 and sustained by the state of New York at a cost of \$1,000,000 a year, has utterly failed in its purpose of making possible the expansion of the cheap water rates prevalent on the lakes, and

helping the farmer and miller in the interior to place their product in the markets of the world to successfully compete with other countries producing their products at the seaboard; thus they have deprived the American producer of a profit legitimately his own.

"To remedy this disorganized condition on the canal is the purpose of a movement now in progress to consolidate existing interests, and, by the expenditure of capital for providing a modern equipment for the enlarged canal, furnishing also new and adequate terminals, also providing a corporate guarantee for a through bill of lading, which will be undisputed for any amount anywhere, by anyone on this continent. This takes the shape of the formation of a company known as the Consolidated Canal & Lake Co., in which are a number of the western millers and jobbers and Buffalo elevating and canal men, with myself and others in New York, directors. Good progress has been made in this direction, first, in securing contracts for freight tonnage at good rates extending over three years; second, in obtaining terminals as a free gift from the city of New York, in that harbor, and from the state authorities, and also in Buffalo. In anticipation of the enlargement of the canal, a modern equipment will now be created, and the business will be inaugurated next May with an initial fleet to be increased in the two following years to an extent that will enable the canal to carry the whole 10,000,000 barrels of flour, instead of less than 1,000. "The immediate necessity for making available this independent artery from the center of the continent to the sea by an all water route is found in the remarkable concentration of railroad ownership in a few hands. The acquirement of the Lehigh Valley road by Mr. Pierpont Morgan places in the control of that gentleman the five trunk lines that parallel the canal, for long ago he dominated the New York Central as well as the Erie, which he recently reorganized. Having control also of the Reading and the Lackawanna, he dominates the anthracite situation, while the certainty that the Baltimore & Ohio will fall into his hands for reorganization makes it possible for him to get a New York entrance for his southern system, so that he will more or less control the outlets for grain and flour at Newport News, Norfolk, Baltimore, Philadelphia and New York. Owning as he does, also, the control of the New York, New Haven & Hartford and the New England systems, and having also complete control of the Northern Pacific system, connecting the same by steamers from Duluth to Buffalo, where his five New York roads terminate, he dominates the entire railway area and possesses a power greater than that given almost to any other mortal, judging by the area covered, the variety of products affected and the interests involved."

The United States the Rising Nation.

The United States is now entering upon the commercial career long ago seen to be its manifest destiny. Hitherto it has been in a formative or preparatory state. Its citizens have been engaged in the costly and arduous work of developing its natural resources, establishing intercommunication, diversifying industries and endeavoring to supply their own requirements as far as possible. They have always raised surplus crops, and have helped to feed the world. They are now in a position to turn out more manufactured articles than they need, and are assisting to supply the wants of the rest of the world in that regard. Unless remarkable and calamitous changes take place the United States will from this time be a large seller of all kinds of commodities, raw and manufactured, and a comparatively small buyer. This combination will surely make it the richest country in the world and the leader among nations in other respects. No other nation on earth is so well situated to become the future workshop of the world. Nowhere else is food so abundant and cheap, with manufactures so well established and the finest raw materials so plentiful and accessible. In its ability to sustain itself the United States is unique among nations. Its independence, politically and commercially, may well excite the envy of other powers. They can not, however, stay its progress. The ghost of a demoralized currency having been effectually laid, the danger of internal troubles is past. In our case more is always to be feared from dissensions among our own people than from attacks by other countries.—Iron Age.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store in regular elevators at the principal points of accumulation on the lakes, August 21, 1897:

	Wheat, bushels.	Corn, bushels.
Chicago	1,986,000	11,720,000
Duluth	495,000	135,000
Milwaukee	92,000	121,000
Detroit	188,000	28,000
Toledo	574,000	454,000
Buffalo	579,000	416,000
	3,914,000	12,874,000

As compared with a week ago, the above figures show, at the several points named, a decrease of 924,000 bushels of wheat and an increase of 1,633,000 bushels of corn.

Steam vessels have been practically unknown in the coast fisheries of this country, but John H. Dialogue & Son of Camden, N. J., have just launched one, in which they are said to have introduced the best features of English steam trawls. The vessel is 125 feet over all, 25 feet beam and 13 feet hold. She has a triple expansion engine of 350 horse power, and is expected to attain a speed of 13 knots.

Henry E. Rottmer of Washington, who was one of the delegates to the International Congress of Naval Architects and Marine Engineers in London, visited several ship yards on the continent before returning to this country. He speaks very highly of the hospitable manner in which he was received in Germany, mentioning especially the kindnesses of Mr. Ernest Ritter of Winterhude, Hamburg.

Army and navy charts of the lakes are kept in stock by the Marine Review, Perry-Payne building, Cleveland.

Around the Lakes.

James A. Dumont, inspector general of steam vessels, spent a day with the local board at Cleveland this week while on a trip of inspection.

An expenditure of about \$12,000 will be required to repair fire damage recently sustained by the steamer Roby. Repairs are being made in Cleveland.

Preparations are being made at the works of the American Steel Barge Co., West Superior, for the purchase of pneumatic hooks and other labor-saving machinery.

The steamer J. M. Weston is now owned by the Sandusky Fish & Steamboat Co. She was put up for sale at Kenosha, a few days ago, and bid in by the Sandusky firm at \$875.

A 10-inch steam whistle, sounding blasts of five seconds duration, separated by silent intervals of twenty-five seconds, will be established at Menominee light-station, Green bay, about Sept. 4.

Mr. John Stuart Thomson, secretary to Mr. M. F. Plant of the Plant system of New York, has been spending a part of his vacation with Wm. H. Mack of Cleveland and other friends on the lakes.

It is again announced from Duluth that a treaty of peace has been entered into by the three harbor tug lines at Duluth, and rates will be maintained, with Capt. J. T. Rose as arbitrator in all cases of difference.

Names of the United States marshal and district attorney for the northern district of New York, published in the last issue of the Review, were incorrect. The marshal is Fletcher C. Peck of Rochester, and Emory P. Close of Buffalo is district attorney.

Material for the new steel elevator at Port Arthur is to be forwarded by lake from Cleveland by the Warren Boiler Works. James L. Record of Minneapolis has secured the contract for the addition to the new Export elevator, Buffalo. The addition will give the Export an increase of 750,000 bushels in capacity.

Engineer James Reilly, who obtained his papers in Cleveland and was on the Maritana, or some other Minnesota boat, will learn of something to his advantage by addressing C. B. LITTLE, M. E. B. A., No. 63, 112 So. Pearl street, Albany, N. Y. His relatives are settling an estate and his agreement is necessary.

A new tariff for the government dry dock at Kingston is as follows: Vessels up to 200 tons, \$20 per day; over 200 and up to 500 tons, 10 cents per ton for the first day and \$20 for each following day; over 500 tons, 10 cents for the first day and 3½ cents per ton for every day after. This is a reduction of about 50 per cent.

Commander Jewell, U. S. N., light-house inspector at Buffalo, gives notice that two 25-foot spar buoys, painted red, and numbered respectively 2½ and 4½, have been placed to mark the west bank of the channel opposite Strawberry island, Niagara river, and nearly opposite black spar buoys Nos. 3 and 7, on the east bank of the channel. Buoy No. 2½ is in 16 feet of water, and buoy No. 4½ is in 15 feet of water.

An effort is being made to secure the establishment of a gas buoy as soon as possible on Gull island reef, Lake Erie. A light on this reef would be of special value to the passenger steamers that are making regular day and night trips between Cleveland and Toledo, and it would be of great assistance also to the large number of freight vessels that go from such places as Lorain, Cleveland, Fairport, Ashtabula and other ports on Lake Erie to Toledo to load coal. With a light on Gull island reef there would be little danger in making the narrow passage between Middle and Gull islands and proceeding thence past Ballast island and on between Middle Bass and South Bass islands. The passenger steamers are now compelled to follow this route without the assistance of this proposed light, but many of the freight vessels instead of taking the so-called middle passage go far out of their way to the north passage in going to Toledo by night.

Messrs. Danger and Van Liew, United States steamboat inspectors at Port Huron, find the Ira H. Owen at fault for the collision with the Susquehanna in a fog off False Presque Isle, Lake Huron, July 20, and have suspended for ninety days the license of Mate Sidney O. Marsh of the Owen, who was on watch at the time. This is the substance of their finding: "We find the fact to be that just immediately prior to the collision the bow of the Owen was in clear sight of such members of the Susquehanna's crew as were forward, and we think their evidence warrants the conclusion that the speed of the Owen was considerable at this time, all of them stating that she was 'carrying a bone' and breaking the water in front of her. We therefore find the Owen at fault in not navigating with more caution, and in not blowing an alarm signal immediately

U. S. ENGINEER OFFICE, Duluth, Minn., July 10, 1897.—Sealed proposals for building two breakwater piers, each some 2700 feet long, at Lake Superior entrance to Portage Lake Ship Canals, Mich., will be received here until noon, Sept. 10, 1897, and then publicly opened. Information furnished on application. CLINTON B. SEARS, Major Engrs. Sept. 3.

The Bessemer Steamship Company

Solicits Catalogues, Prices and Discounts from manufacturers and wholesale dealers in Ship Machinery, Brass Goods, Rope, Paints, Asbestos, Packing, Hose, Furniture, Piping, Glass and Crockery, Tinware, Ranges, Carpeting, Bedding, Life-preservers, Rafts and Boats, Engineers' Supplies and Tools, Carpenters' Tools, Electric Supplies, Lamps, Grate Bars, Castings, etc., etc., etc.

ALSO QUOTATIONS from Market men and Grocers on the Lakes for Provisions and Meat, best quality only.

CATALOGUES without quotations are not wanted.

ALL GOODS except provisions to be delivered in Cleveland.

Address L. M. BOWERS, General Manager, CLEVELAND, OHIO.

upon hearing the port signal blown by the approaching steamer, for the reason that it appeared to the officer of the Owen that the port signal was blown by an approaching steamer, two points off her starboard bow and only a short distance ahead. We also find the Owen at fault for not immediately stopping and reversing at the time the port passing signals were given, as it must have been apparent that there was danger in keeping up headway under the circumstances and attempting to cross the track of the approaching steamer."

Cuban Iron Ore.

Iron ore shipments from Cuba to the United States do not seem to have reached anything like the total that was anticipated when the mines were opened some twelve years ago. Up to the close of 1896 the shipments, from the opening of the mines in August, 1884, had reached an aggregate of only 3,034,504 gross tons, the great bulk of which was from the mines of the Juragua company. The Bulletin of the American Iron and Steel Association says:

"The Juragua Iron Co., Ltd., of Philadelphia, advises us that on Aug. 3, 1897, the shipments of iron ore from its mines in Cuba passed the 3,000,000-ton mark, the steamship William Anning having left the Cuban port of Santiago at seven o'clock on the morning of the date named with a cargo of ore which carried the total shipments by the company past the third million. The first shipment of iron ore made by the Juragua Iron Co. from its Cuban mines left Santiago on Aug. 7, 1884, in the steamship African. On Aug. 19, 1890, over six years later, the steamship Earnwell, carrying cargo No. 404, sailed from Santiago, her cargo completing the first million tons of ore shipped from the company's mines. Almost three years afterwards, on July 25, 1893, the second million mark was passed, the shipment being cargo No. 765, forwarded in the steamship Hopetoun. As above stated, the steamship William Anning, carrying cargo No. 1,083, which completed the third million, left Santiago on Aug. 3, 1897, over four years having elapsed from the time the company passed the second million ton mark to the time the third million mark was reached. We understand that the shipments of iron ore by the Spanish-American Iron Co., whose mines are near those of the Juragua Iron Co., have probably been larger in the last few months than at any previous time in its history. The Sigua Iron Co., which also owns iron ore mines in the vicinity of the Juragua and Spanish-American properties, has not mined any iron ore since 1893."

The Magnolia Metal Co. of New York seems to be unfortunate in being called upon, on two or three occasions of late, to go into court to defend its patents and matters pertaining to the manufacture of its goods. New York papers of recent date contain accounts of another action at law begun by the Magnolia company on account of difficulties encountered at its factory in Stirling, N. J. Mr. E. C. Miller, vice-president of the company, has caused the arrest at Stirling of H. G. Torrey, J. Gray Torrey and others on the charge of breaking into the factory at 2 o'clock in the morning of Aug. 6, maliciously destroying property and carrying away tools and other property. The parties arrested were connected with the management of the factory, but the relations of the company with them had been severed and it is claimed that their object was to injure the business of the concern. Mr. H. G. Torrey is United States assayer for the district of New York, and the arrest was the cause of lengthy articles in the New York papers.

Chas. E. & W. F. Peck,

58 William St.
NEW YORK CITY.

812 Royal Insurance Building,
CHICAGO, ILL.

C. T. BOWRING & CO.,
5 & 6 Billiter Ave., E. C.
LONDON, ENG.

INSURANCE.

BROWN & CO.,
202 Main St.,
Buffalo, N. Y.

J. G. KEITH & CO.,
138 Rialto Bldg.,
Chicago, Ill.

LA SALLE & CO.,
Board of Trade Bldg.,
Duluth, Minn.

Are prepared to make rates on all classes of Marine Insurance on the great lakes, both CARGOES and HULLS.

"GREAT LAKES REGISTER."

F. D. HERRIMAN, Surveyor-General, Chicago, Ill.

Newport News Shipbuilding & Dry Dock COMPANY.

WORKS AT NEWPORT NEWS, VA.
(On Hampton Roads.)

Equipped with a Simpson's Basin Dry Dock capable of docking a vessel 600 feet long, drawing 25 feet of water, at any stage of the tide. Repairs made promptly and at reasonable rates.

SHIP AND ENGINE BUILDERS.

For estimates and further particulars, address

C. B. ORCUTT, Pres't,
No. 1 Broadway, New York.

U. S. ENGINEER OFFICE, TELEPHONE Building, Detroit, Mich., Aug. 2, 1897.
Sealed Proposals for Dredging and Submarine Rock Excavation, in the St. Marys river, Mich., will be received here until 12 o'clock noon (Standard time) August 31, 1897, and then publicly opened. Apply here, or at U. S. Engineer Office, Sault Ste. Marie, Mich., for specifications.

G. J. LYDECKER, Lt. Col., Engrs.

Aug. 26.

ADVERTISING RATES ON APPLICATION. COPY OF BOOK AND NAME IN DIRECTORY \$5.

BLUE BOOK OF AMERICAN SHIPPING

409 PERRY-PAYNE BLDG. CLEVELAND, O. U.S.A.

CONTAINING PARTICULARS OF ALL THE PRINCIPAL COAST AND LAKE STEAM AND SAIL VESSELS

FOR CIRCULARIZING—★ LIST OF 1000 NAMES AND ADDRESSES, COVERING THE PRINCIPAL SHIP OWNERS AND BUILDERS OF THE UNITED STATES

3000 NAMES OF CAPTAINS
4000 NAMES OF ENGINEERS

ON FILE IN THE PRINCIPAL MARINE ORGANIZATION HEADQUARTERS OF THE WORLD. HANDSOMELY ILLUSTRATED.

A DIRECTORY OF SHIP AND ENGINE BUILDERS AND THE MARINE BUSINESS OF THE UNITED STATES.

USED BY SHIP BUILDERS AND OWNERS FOR GETTING PRICES ON MATERIAL AND SUPPLIES

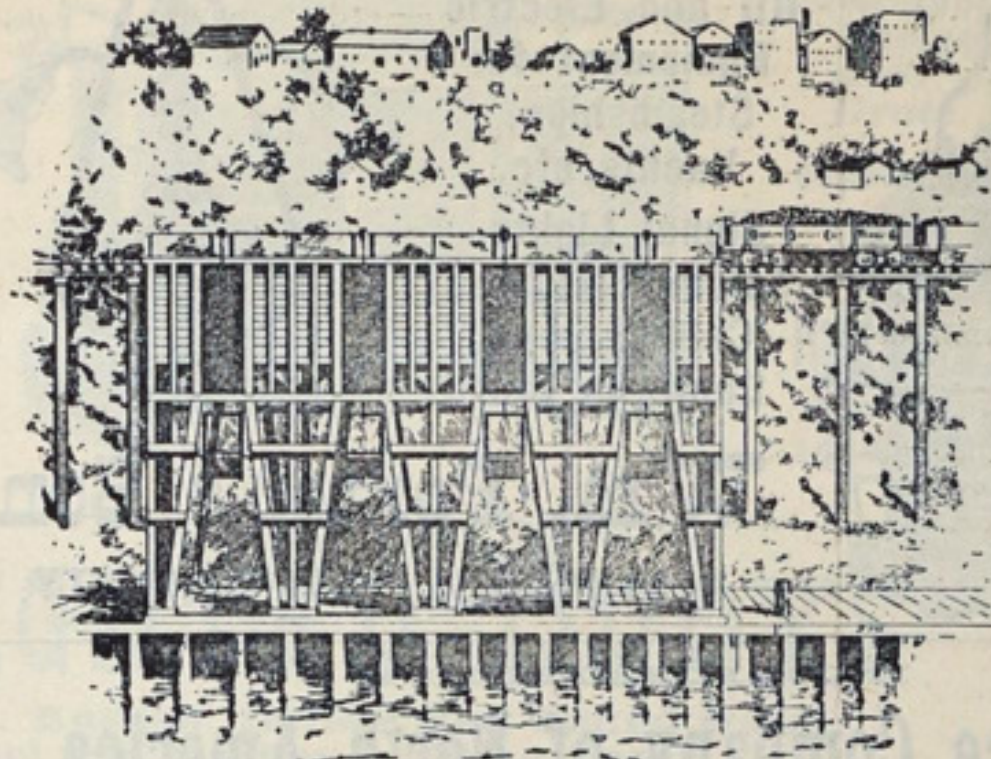
THE ONLY BOOK OF THE KIND PUBLISHED IN THE U.S.

PUBLISHED JULY 15.

Now ready for delivery to Purchasers.

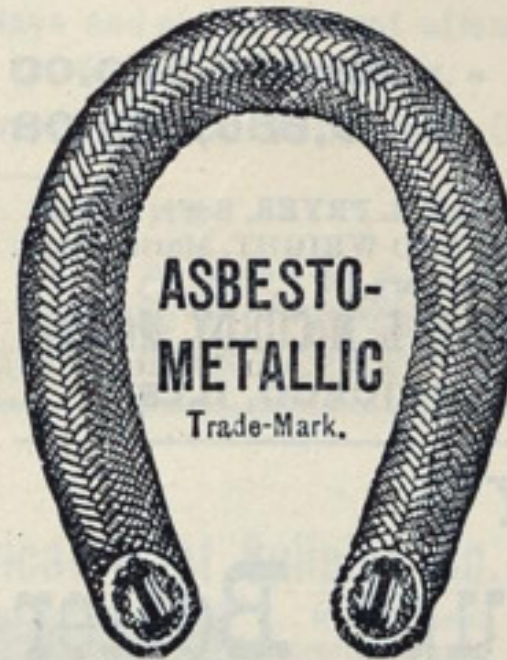
FUEL DOCKS OF OSBORNE, SAEGER & CO.

Cuyahoga River, just above Superior St. Viaduct, Cleveland, O



Best Youghiogheny Steam Coal Furnished Day or Night. No delay as Elevated Pockets are used.

Telephone 1106.



ASBESTO-METALLIC
Trade-Mark.

Lucky is the Engineer Who Uses

ASBESTO - METALLIC PACKING

It is in use on more lake steamers than any other, because it meets the requirements.

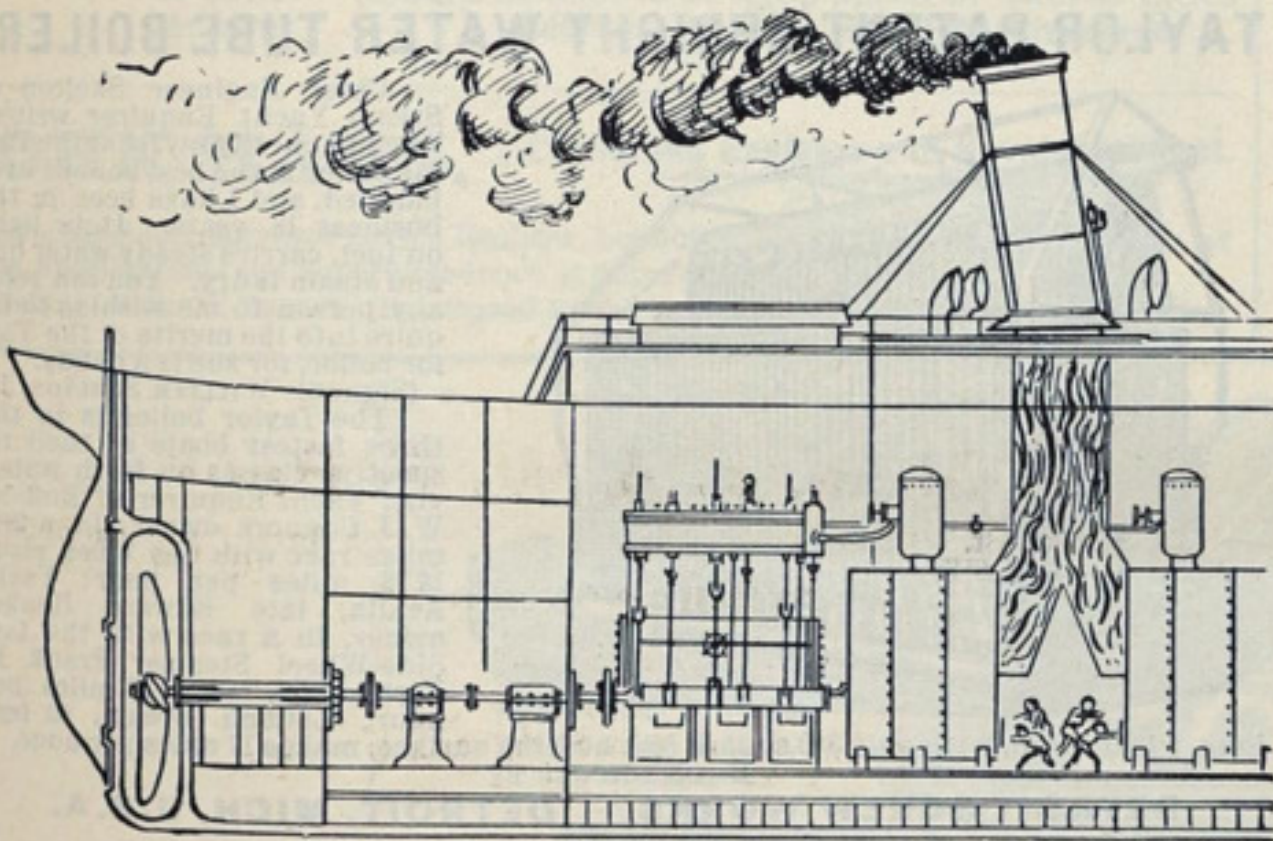
AMERICAN STEAM PACKING CO.,

Original Manufacturers of

PISTON PACKINGS,

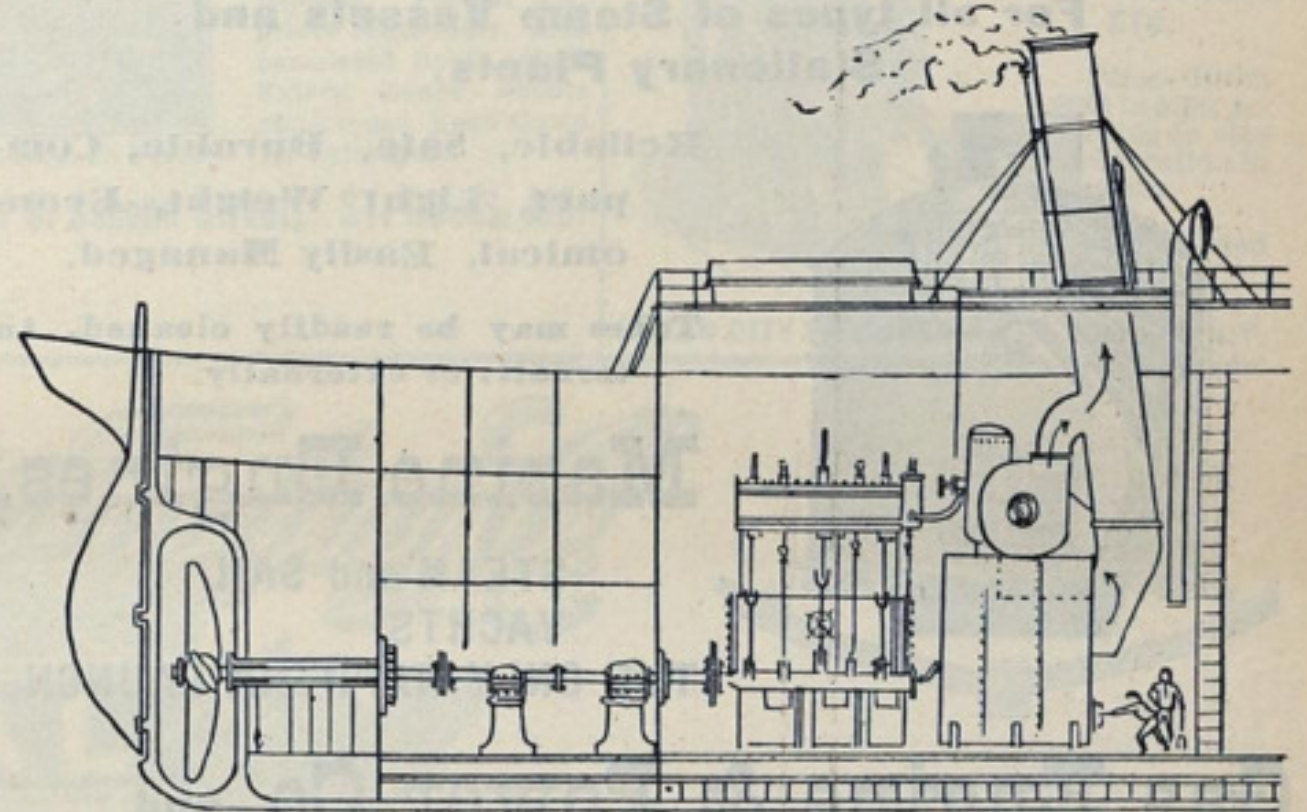
60 Federal St.,

BOSTON, MASS.



Natural Draft.—Recommended to Owners who Have Money to Burn.

TRIP SHEET OF STEAMER
From LORAIN, OHIO, August 2, 1896,
To SUPERIOR, WIS., 1896.



Ellis & Eaves Induced Draft and Serve Tubes—Guaranteed to Save 25% in Fuel.

MASTER
From TWO HARBORS, WIS., 1896,
To CLEVELAND, OHIO, August 13, 1896.

Corresponding Amounts, Provided this Steamer had been Equipped with Ellis & Eaves Draft and Serve Ribbed Tubes.

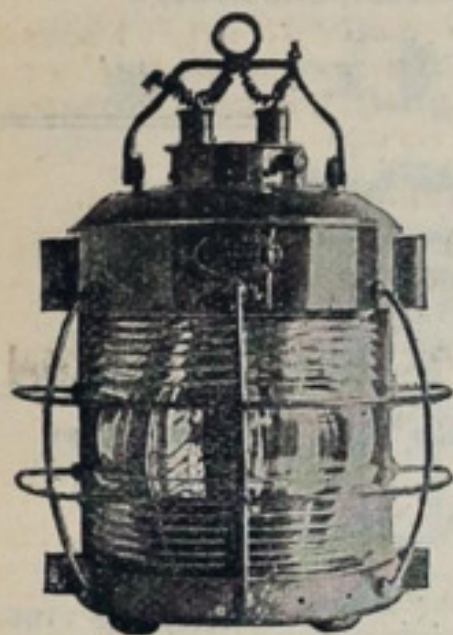
ENGINEER'S DEPT.								Saving.			
Fuel, 165 tons.....	\$348	61				\$261	46			25	
Oils.....	15	14				15	14				
Repairs.....	1	00				1	00				
Supplies.....	11	66		\$376	41	11	66				
STEWARD'S DEPT.											
Provisions.....	119	20									
Supplies.....	3	37		122	57				289	26	
Handling Cargoes (unloading).....	364	40									
Hull Repairs.....	20	25									
Towing.....	12	00									
Chandlery.....	1	38									
Sundry.....	13	15		411	18				411	18	
WAGES—ELEVEN DAYS.											
Captain.....	\$175.00	per mo.	64			64	16				
Mate.....	80.00		29			29	33				
2d Mate.....	56.00		20			20	54				
2 Wheelmen.....	34.00 (12.46)		24			24	92				
2 Lookouts.....	34.00 (12.46)		24			24	92				
1st Engineer.....	112.50		41			41	25				
2d Engineer.....	80.00		29			29	33				
2 Greasers.....	34.00 (12.46)		24			24	92				
3 FIREMEN.....	34.00 (12.46)		37			37	38				
4 Deck-hands.....	17.00 (6.23)		24			24	92				
1st Cook.....	60.00		22			22	00				
2d Cook.....	17.00		6			6	23				
Total Expenditures.....				349	90				349	90	
				1260	06				1172	91	

Up Cargo, 2453 (1900) net tons.
Down " 2265 gross "

Net saving each trip, \$87.15.

The Globe Iron Works Company, Cleveland, O., Sole Manufacturers and Agents for the Great Lakes.

MARINE LAMPS



Oil and Electric
Equipment for
Steamships,
Yachts, etc.

Signal Lights,
Saloon Fixtures,
Cabin Lamps,
Lanterns, etc.



Wm. Porter's Sons,
271 Pearl St., NEW YORK CITY.

INCORPORATED 1794.

Insurance Company of North America.

CAPITAL, Paid up in Cash, - - \$3,000,000.00
ASSETS, - - - - - 9,686,808.08

CHARLES PLATT, President.

EUGENE L. ELLISON, Vice-President.

JOHN H. ATWOOD, Assistant Secretary.

GREVILLE E. FRYER, Sec'y. & Treas.

T. HOWARD WRIGHT, Marine Sec'y.

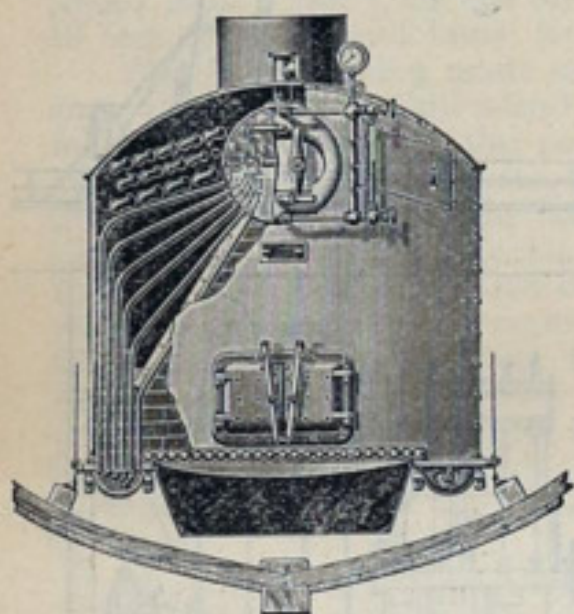
GEORGE L. McCURDY, Manager
CHICAGO, ILLS.

Lake Marine Department.

SEABURY'S

Safety Water Tube Boiler

For all types of Steam Vessels and
Stationary Plants.



Reliable, Safe, Durable, Com-
pact, Light Weight, Econ-
omical, Easily Managed.

Tubes may be readily cleaned, in
ternally or externally.

Marine Engines,

STEAM and SAIL
YACHTS,
THE ONLY NAPHTHA LAUNCH.

Gas Engine & Power Co. and
Charles L. Seabury & Co. Consolidated.
MORRIS HEIGHTS, NEW YORK CITY.

G. H. FOSTER, Prest. MARK H. HANLON, V.-Prest. & Secy. W. H. WARNER, Treas.
DAVID BARNHISEL, Gen'l Mgr.

The Inter-Ocean Coal & Coke Co.

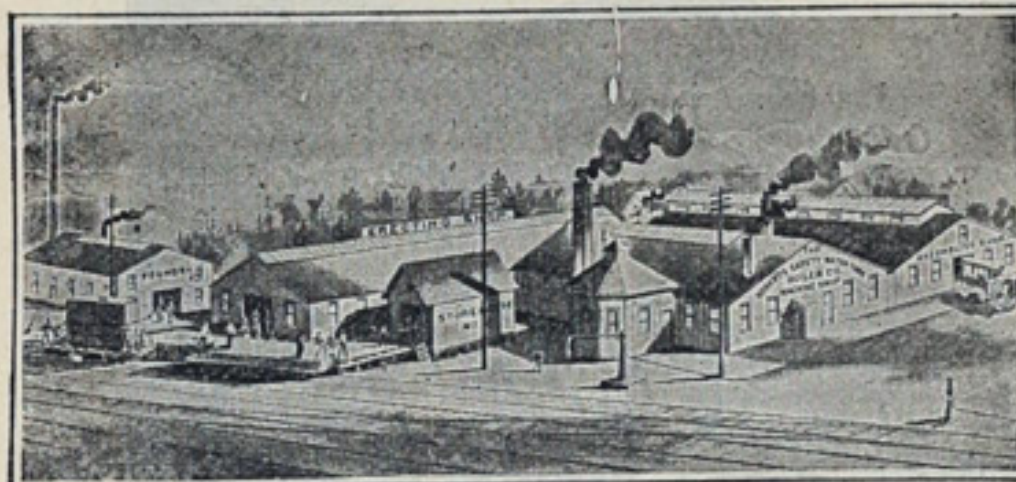
General office, 513 Perry-Payne Bldg., Cleveland.

PRODUCERS AND SHIPPERS.

Choicest Grades of YIOUGHIOGHENY COAL FOR STEAMBOAT FUEL.

Lighter in Cleveland Harbor of 400 tons capacity.

CLEVELAND DOCKS, just north of Main Street bridge.
SAULT RIVER DOCK at Sault Ste Marie, ¼ mile below the locks.



Office of
AMERICAN
STEEL BARGE
Co.

West Superior
Wis.,
Oct. 31, 1895.

The Roberts
Safety Water-
Tube Boiler Co.,
39 and 41 Cort-
landt St., New
York.

Gentlemen:
Replying to
yours of the
28th I am glad

to say that the boiler you furnished us for tug "ISLAY" is giving entire satisfac-
tion. I have heard no complaint about it whatever, but have heard a good deal in its
favor. I ride on the boat frequently and must say that I am much pleased with its
work. Very Truly yours, Alexander McDougall, General Manager.

THE ROBERTS BOILER is the Cheapest, Best and Lasts Longest.

Adapted for use in Yachts, Launches, and Vessels of all Kinds.

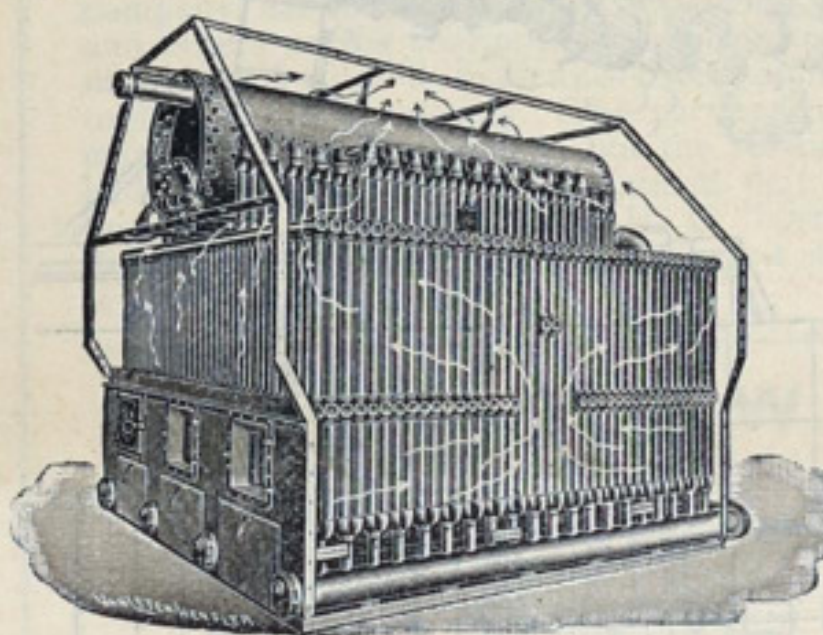
Handsome Illustrated Circular sent free on application to

The Roberts Safety Water Tube Boiler Co.,

WORKS, RED BANK, N. J.

39 & 41 Cortlandt St., NEW YORK.

TAYLOR PATENT UPRIGHT WATER TUBE BOILER.



Chief Engineer Skelton of
Steam Yacht Enquirer writes:
"I can honestly say, that the Tay-
lor boiler is the best boiler I ever
handled, and I have been in the
business 18 years. It is light
on fuel, carries steady water line
and steam is dry. You can refer
any person to me wishing to in-
quire into the merits of the Tay-
lor boiler, for she is a dandy."

(Signed) WILLIAM SKELTON, Jr.

The Taylor boiler is in the
three fastest boats of their re-
spective classes on fresh water,
viz., Yacht Enquirer of Buffalo,
W. J. Connors owner; in a 2½
miles race with Say When made
18.78 miles per hour; Yacht
Azalia, late Edward Henkel
owner, in a race with the fast
Side-Wheel Steamer Frank E.
Kirby, 1896, made 18 miles per
hour; Launch Dream, 63 feet

long, 9 feet beam, with only 350 square feet heating surface, makes 17 miles per hour.

MANUFACTURED BY

DETROIT SCREW WORKS, DETROIT, MICH, U. S. A.

ROBERT CURR, SURVEYOR OF IRON & STEEL HULLS,
Plans and Specifications furnished.

409 Perry-Payne Bldg.

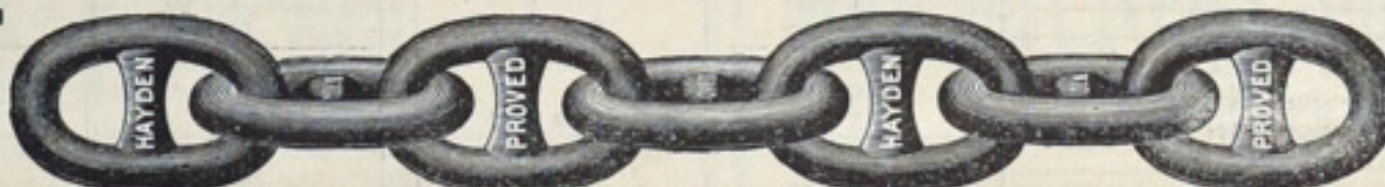
Telephone 472.

CLEVELAND, O.

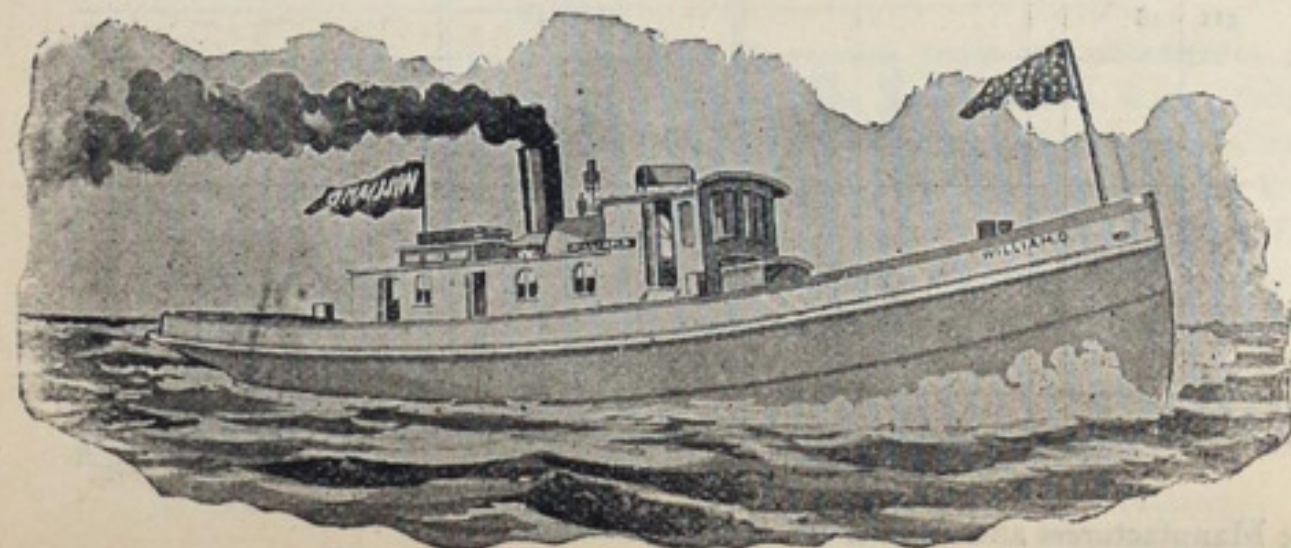
Chain Department * P. HAYDEN S. H. CO. * Columbus, Ohio.

Our Chain in use on the Largest Steamers on
the Lakes:

The Zenith City, Victory,
North West and North Land,
and many others.



All kinds of Chain—
Stud and Close Link,
Cable Chains.
Write for Prices.



C. E. GROVER, Prest.
D. R. HANNA, V. Prest.

W. A. COLLIER, Sec. & Treas.
CAPT. PHILIP SHIED, Marine Supt

The Ashtabula Tug Co.

Incorporated.

W. A. COLLIER, Gen. Mgr.

MAIN ST. BRIDGE,
CLEVELAND, O.

CLEVELAND, Tel. 409.

ASHTABULA, Tel. 149.

CHICAGO.
BARRY BROS.
Independent Tug Line.

TUGS

Rita McDonald,
Crawford,
C. M. Charnley,
D. P. Hall,
Ira O. Smith.

Wm. Dickinson,
W. H. Wolf,
Welcome,
Commodore,
Jack Barry.

Office, 240 South Water Street,
Telephone Main 273.

3 long whistles call our tugs.

DULUTH.
BARRY
Towing & Wrecking Co.

TUGS.

G. A. Tomlinson.

Industry,

Violet H. Raber,

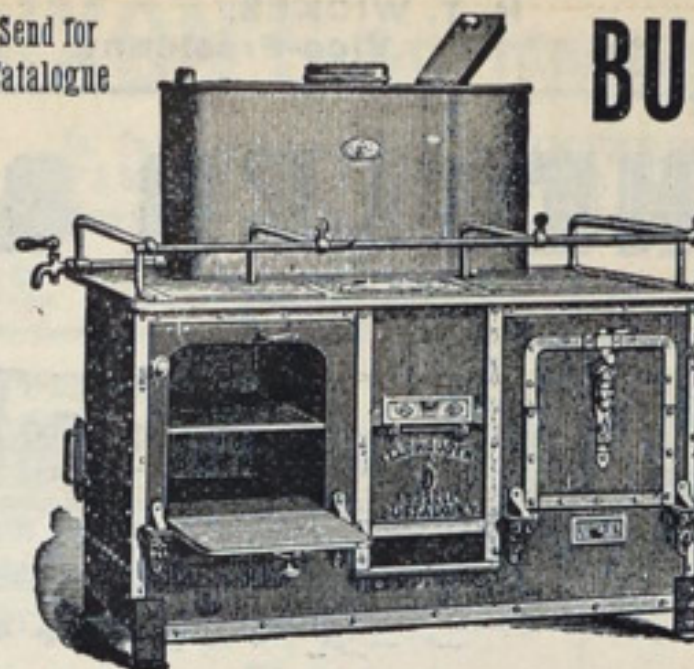
Prodigy.

Office, foot of 5th Ave., West.

Telephone 544.

3 long whistles call our tugs.

Send for
Catalogue



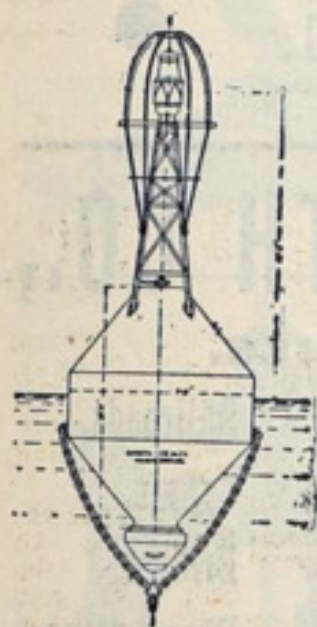
BUFFALO WROUGHT STEEL RANGES

*Steamboat and Vessel
Ranges and Boilers,
with patent Rotary
Grate.*

SOMETHING NEW AND GOOD.
We also carry the **STAMFORD TUG**
AND **YACHT GALLEY STOVES.**

RUSSELL & WATSON

Successors to Felthousen & Russell.
145 Main St., BUFFALO, N. Y.



PINTSCH GAS LIGHTED BUOYS

Adopted by the English, German, French, Russian, Italian, and United States
Light House Departments, for Channel and Harbor Lighting; over
500 gas buoys and gas beacons in service.

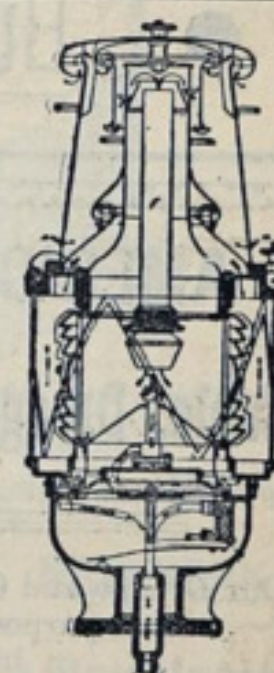
BURN CONTINUOUSLY from 80 to 365 days and nights without attention, and can be seen a
distance of six miles.

Brilliant and Steady Illumination. Economical and Reliable in Operation.

CONTROLLED BY THE

Safety Car Heating & Lighting Company,

160 BROADWAY, NEW YORK CITY.



WANTED

To lease, purchase or secure, a passenger boat to make an
excursion run for whole season. Must be a good boat, well
fitted for that purpose, not over 200 feet keel and must not
draw more than seven feet water loaded, and five feet would
be better. Should be able to develop speed of twelve miles
per hour.

Address **MARINE REVIEW**, Cleveland, O.

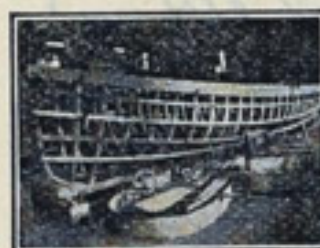
JOHN HAUG, Consulting Engineer and Naval Architect.

Ship and Engineer Surveyor Lloyds Register, London.

Plans, Specifications and Superintendence of Ships and their Machinery.
specialties—Bulk Oil Vessels High Speed Yacht Engines, etc.

206 Walnut
Place,
Philadelphia.

American Boat Building Co. Incorporated.

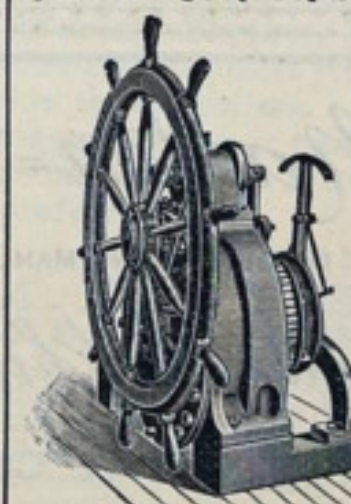


35x7 foot Launch Frame.

Knock-Down Boats,
something new. We do
the work, you nail
together. Freight low,
prices reasonable. Also
completed Boats, Half-
Raters, Knock-Aabouts
and Canoes. Send stamp
for catalogue.

3517-21 S. Second Street, ST. LOUIS, MO.

Queen City Hydraulic Steerer.



Best and
Most Powerful
Steerer

FOR TUGS,
STEAMERS,
ETC.

Price—From
\$650 to \$750, ac-
cording to size
and location in
steamer.

Manufactured
by

QUEEN CITY ENGINEERING CO., Buffalo, N. Y.

C. S. Richardson Fueling Co.

FUELING DOCKS:
NORTH PIER
18TH STREET BRIDGE,
ILLINOIS CENTRAL SLIP C.

STORAGE DOCKS FOR ANTHRACITE:
KINGSBURY ST. BETWEEN INDIANA & ERIE STS.
ELSTON AVE. DIVISION ST. BRIDGE (NORTH BRANCH)
NORTH AVE. BRIDGE.
DIVISION ST. BRIDGE (OGDEN CANAL)
SOUTH HALSTED ST. BRIDGE.

COAL

OFFICE,
225 DEARBORN ST.

CHICAGO.

For Sale:

DREDGES, TUGS and SCOWS.

Two Dredges and six Dump Scows, one Flat Scow,
one Derrick Scow and four Tugs—

One with 15 by 17 engine, allowed 110 lbs. steam.

" " 17 by 16 " " 110 " "

" " 20 by 22 " " 125 " "

" " 20 by 24 " " 110 " "

Inquiries from parties who mean business cheerfully
answered.

JAMES ROONEY, 1118 Collingwood Av., Toledo, O.



ALKALI WATER PURIFIER!

A Pure Chemical for the safe Removal and Preven-
tion of Scale in Steam Boilers. In use by many of the
larger steamship lines on the great Lakes. Guaranteed.

MANUFACTURED BY

THE J. H. PARSONS CHEMICAL CO.,
1509 Masonic Temple, CHICAGO, ILL.

P. M. CHURCH & CO.,
SAVINGS BANK BLOCK, SAULT STE. MARIE, MICH

LEADING DEALERS IN

Ship Chandlery,

Marine Hardware, Paints, Oils, Packings, Cordage, Etc.

FIRST-CLASS COPPERSMITH AND TINSHOP IN CONNECTION.

The Chase Machine Co.

111 Elm St., Cleveland, O.

MACHINISTS
and **ENGINEERS**

MANUFACTURERS OF
Land and Marine Engines
and Steam Pumps.

SOLE OWNERS AND MANUFACTURERS OF
Chase Fog Whistle Machine.

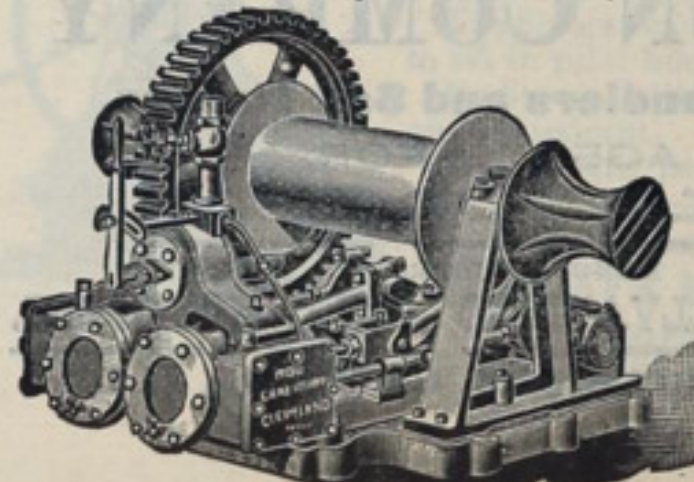
Over 150 in use on the best class
of Lake Steamers.

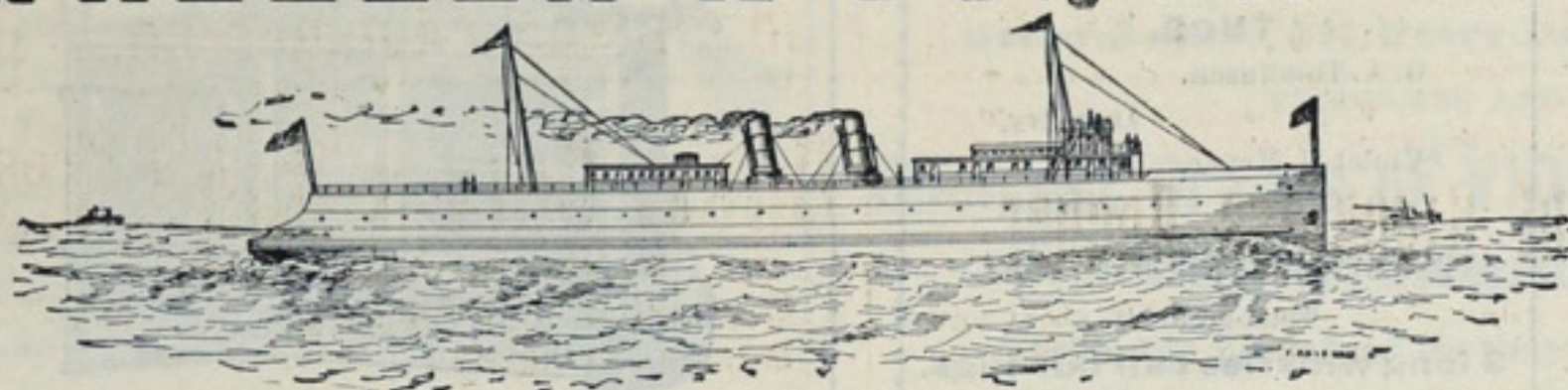
Special Attention given to

MARINE REPAIR WORK.

Engineers' Supplies,
Asbestos Pipe and Boiler Covering.

TELEPHONE 984.



F. W. WHEELER,
President.H. T. WICKES,
Vice-President.C. W. STIVER,
Secretary.JNO. S. PORTER,
Treasurer.**F. W. WHEELER & CO., WEST BAY CITY, MICH.**

F. & P. M. CAR FERRY.

● Builders of all kinds of METAL AND WOODEN SHIPS. ●

AMERICAN CHAIN CABLE WORKS.

ESTABLISHED 1865.

Cable, Dredge, Quarry, Shipping, Crane and Rafting

CHAINS.

Our Dredge and Crane Chains are made of Iron Rolled Specially for that purpose in three qualities, "Burden's," "H. B. & S." iron, and "Burden's Best Best" iron.

THE J. B. CARR COMPANY, TROY, NEW YORK.

The Martin-Barriss Co.

IMPORTERS AND MANUFACTURERS OF

Mahogany, White Mahogany,

AND ALL NATIVE CABINET WOODS.

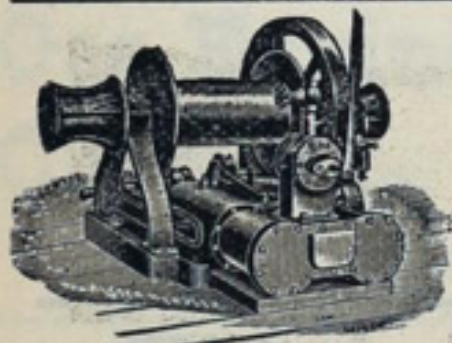
HIGH GRADES OF KILN DRIED WOODS FOR CABIN WORK AND INSIDE TRIM.

White Oak Timbers and Plank

CONSTANTLY ON HAND AND SAWED TO ORDER ON SHORT NOTICE.

654 Seneca Street,

Cleveland, Ohio.

**DOCK and DECK HOISTS**
ALL KINDS OF*Machinery & Friction Hoists.*

SEND FOR PRICES AND CIRCULARS.

JACKSON & CHURCH,
SAGINAW, MICH.**HOWARD H. BAKER & Co.****Ship Chandlers and Sail Makers,**

18 to 26 Terrace. — BUFFALO, N.Y.

H. CHANNON COMPANY

Ship Chandlers and Sail Makers.

AGENTS FOR

RYLANDS BROS.

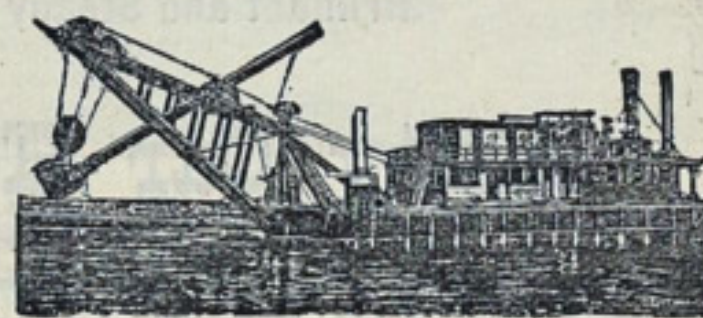
MANUFACTURERS OF

ENGLISH GALVANIZED STEEL HAWSEERS,

24-26 Market Street, CHICAGO, ILL

**THE L. P. & J. A. SMITH CO.,**

Contractors of Public Works.

Dredging,
Pile-Driving,
Breakwaters,
Dry Docks and
Pier Building,Railroads,
Canals,
Bridges,
Foundations,
Etc., etc.

23 River St.,

CLEVELAND, O.



H. E. STEVENS.

TOM MEAD.

LEW PRESLEY

BUCKEYE STEAM FITTING CO.*Steam Fitters, Engineers Supplies,*

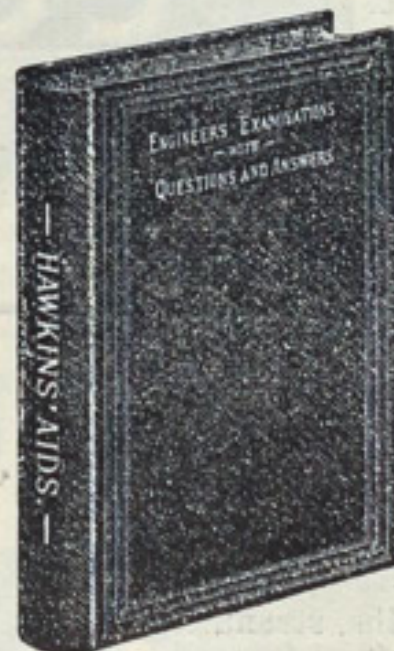
Phone 4058.

AGENTS FOR

RAINBOW PACKING.

Open Day and Night.

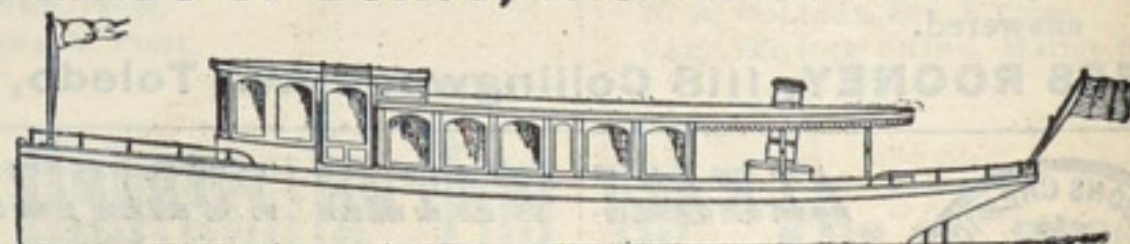
117 River St., CLEVELAND, O.

THOS. DREIN & SON,TATNALL AND RAILROAD STS.,
WILMINGTON, DEL.Builders of Metallic
Life Boats and Rafts,
Yachts and Pleasure
Boats, Life Pre-
servers. Outfit for
Lake Steamers a
Specialty.**"Engineers' Examinations"**
With Questions and Answers.

Printed on heavy paper and bound in red leather.

Any young engineer, greaser or fireman ought to have it.

Sent postpaid to any address, on receipt of \$2.00.

MARINE REVIEW,410 Perry-Payne Bldg.,
Cleveland, O."Maxims and Instructions for the Boiler Room," \$2.50
"Hand-Book of Calculations for Engineers," 2.50**ALL KINDS OF BOATS, YACHTS AND LAUNCHES**

Frames set up, MARKED AND SHIPPED KNOCKDOWN to any part of the world.

Send 50 cents for "ALBUM OF DESIGNS"; 72 Pages, 43 Subjects, 66 Designs.

Address Station A.

FRED W. MARTIN, Yacht Designer,

NORTH CHICAGO ILL. (Formerly of Racine, Wis.)

DIXON'S Graphite Pipe Joint Compound

Enables you to MAKE A TIGHTER JOINT than you can possibly make with red lead. You can do it easier, and parts can be separated at any time without breaking anything. Send for sample and circular.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.

Fred'k Baldt, President. W. M. Gelston, Vice-President
W. S. Bickley, Sec'y and Treas.

Baldt Patent Stockless Anchor.

Made of the finest quality of open-hearth steel and constructed on the ball and socket principle.

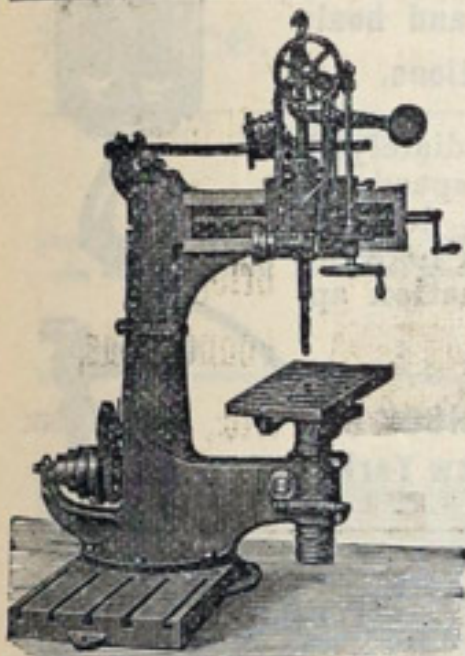
Many points of superiority over ordinary Stockless Anchors.

BALDT ANCHOR COMPANY,
CHESTER, PA.

WALTER MILLER, Western Reserve Bldg.,
Cleveland, Ohio,

Representative for the Great Lakes.

New catalogue containing valuable tables sent on application.



Bement, Miles & Company,
PHILADELPHIA, PA.

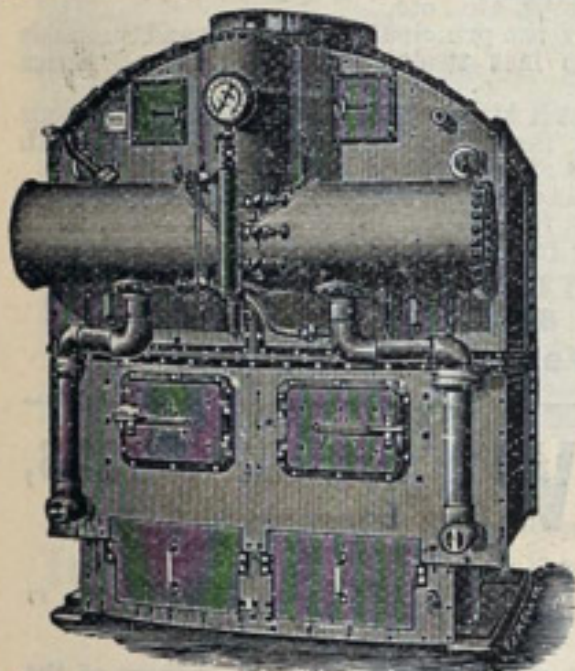
MANUFACTURERS OF

Metal Working Machine Tools

For Ship Yards, Railroad Shops,
Locomotive and Car Builders,
Machine Shops, Rolling Mills,
Steam Forges, Boiler Shops,
Bridge Works, etc., etc.

**Steam Hammers, Steam and
Hydraulic Riveting Machines.**

New York Office: Taylor Bldg. No. 39 Cortlandt St.
Chicago Office: 1534 Marquette Building.

**ALMY'S PATENT
SECTIONAL****Water-Tube Boilers.**

NOW USED IN

18 Passenger Boats from 70 to 160 feet long.
27 Steam Yachts from 50 to 160 feet long.
U. S. Torpedo Boat "Stiletto."

Numerous Small Launches and Stationary
Boilers are giving most excellent results.

ALMY WATER-TUBE BOILER CO.,

No. 178-184 Allens Avenue,
near Rhodes St.

PROVIDENCE, R. I.

VANDUZEN Steam JET PUMPS

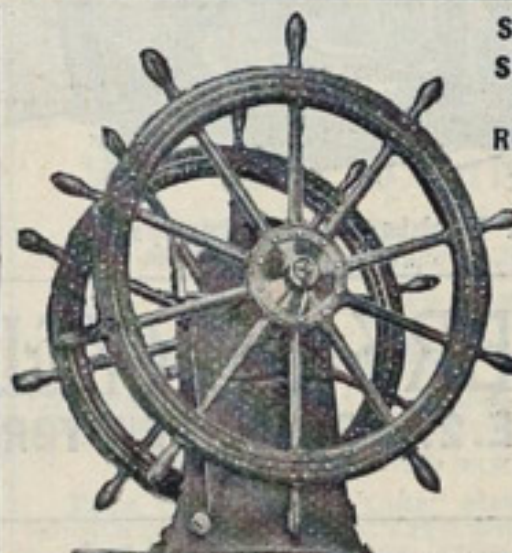
THE BEST IN THE WORLD.
Pumps any kind of Liquid. Always in order.
Never clogs nor freezes. Fully Guaranteed.
COST \$7 AND UPWARD. Especially useful for
Mines, Quarries, Pits, Wells, Clay Pits, Breweries,
on Steamships, Ferryboats, Sugar Plantations, etc.
A full stock always on hand.

Descriptive Catalogue and Prices fur-
nished Free. **THE E. W. VAN DUZEN CO.,**
Cincinnati, O.

SELLERS' RESTARTING INJECTOR

LONG SERVICE
WIDE RANGE
SIMPLEST AND BEST
HOT WATER
LONG LIFTS

For Stationary, Portable,
Traction Engines, Tugboats, &c.
Thoroughly Reliable—Perfectly Automatic.
JENKINS BROS., - Selling Agents,
NEW YORK, BOSTON, PHILA., CHICAGO.



SIMPLE,
STRONG
and
RELIABLE.

Changed from
Steam
to
Hand
by one
Lever
in
Less
Than
One
Second

No. 8
BECK
Patent
Steam
and Hand
**STEERING
GEAR.**

BUILT BY
**Pawling &
Harnischfeger,**
MILWAUKEE,
WIS.

**DIXON'S Lubricating Graphite**

Is fully explained in an INTERESTING AND INSTRUCTIVE
PAMPHLET which is FREE to all interested. It will pay all
Engineers and Machinists to SEND FOR IT.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.

Chas. Corv & Son

Manufacturers of the
**Mechanical and Electric
Marine Telegraph,**



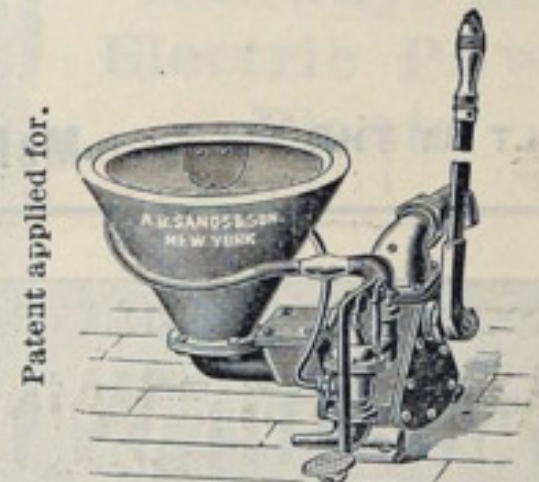
**Electrical
Helm Indicators
Electric Call
Bells.**

Engine Bells and
Brass Work of
all descriptions,
Shrieking and
Siren Whistles.

278 DIVISION ST.,
NEW YORK CITY.

Alfred B. Sands & Son

**YACHT PLUMBERS,
AND MANUFACTURERS OF
YACHT PLUMBING SPECIALTIES.**

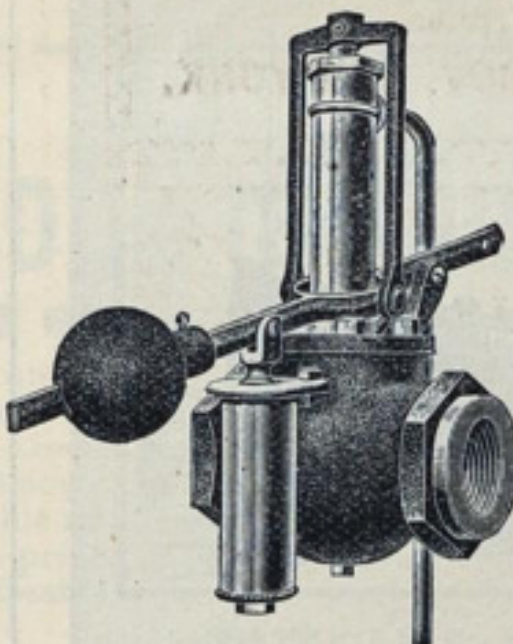


Patent applied for.

The only pump water closet in the world so
constructed as to be positively free
from danger of flooding.

**Folding Lavatories, Pumps, Ventilators,
Etc., Etc.**

134 Beekman St., NEW YORK.

**The "DAVIS" Pressure Regulator
and Reducing Valve.**

Is the simplest and best for reducing the pressure
to Steam Steering Engines, Donkey Engines,
Steam Winches and all places requiring a uniform
pressure below that of boilers.

No diaphragms, spring or packing.

Cut shows ball weight. We can furnish scale
weights if preferred.

MANUFACTURED BY
G. M. DAVIS & CO.
106 N. Clinton St., CHICAGO, ILL.

FOR SALE BY

R. E. Hills, Chicago. U. H. McCutcheon, Buffalo
Geo. Worthington Co., Cleveland.
P. M. Church, Sault Ste. Marie. Jas. Walker & Son, Detroit
Jas. Clements & Son, Bay City, Mich.
Cleveland Ship Building Co., Cleveland.
Chicago Ship Building Co., Chicago.

Selling agents—The McIntosh-Huntington Co., Cleveland, O.; The Detroit Sheet Metal
and Brass Works, Detroit, Mich.

NEVERSINK CORK JACKET AND LIFE BELT.

Warranted 24 lb. Buoyancy and full Weight of Cork, as required by U. S. Inspectors
Consolidated Cork Life Preservers. Superior to all others. Ring Buoys and Fenders.

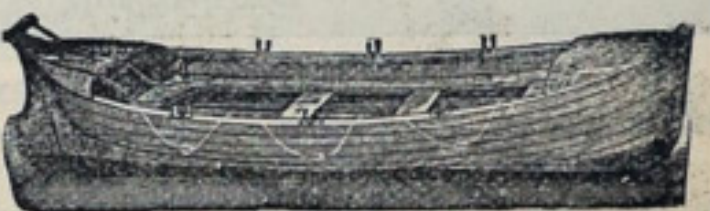
SAFEST, CHEAPEST. Approved and adopted by U. S.
Board of Supervising Inspectors.

Also adopted by the principal Ocean, Lake and River
Steamer Lines as the only Reliable Life Preserver. Vessels
and the trade supplied. Send for catalogue.

Awarded four Medals by World's Columbian Exposition



**Metallio
and
Wooden
Life
Boats.**



Metallio Life Rafts, Marine Drags.

Manufacturer of Woolsey's Patent Life Buoy, which is the
lightest, cheapest and most compact Life Raft known.

Send for Illustrated Catalogue.

Get our prices before buying elsewhere.

D. KAHNWEILER,

437 Pearl Street, NEW YORK CITY.

SHERIFFS STEAM STEERER.

MADE IN TWO SIZES

Are easy to adjust and can
be handled by any one.

The Steerer can be arranged
to set in pilot house or aft.

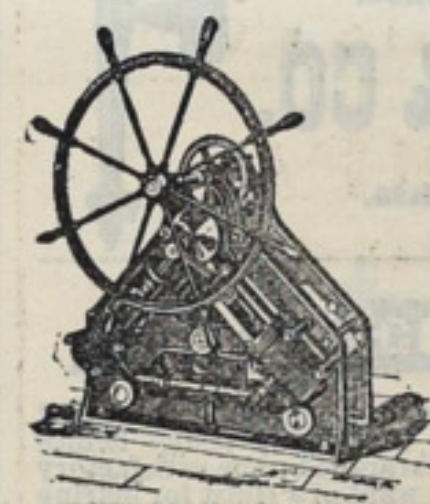
No Steerer will be sold with-
out a quadrant.

Steerer will be sold on ap-
proval.

Manufactured by

SHERIFFS MFG. CO.

126-130 Barclay Street,
MILWAUKEE, WIS.

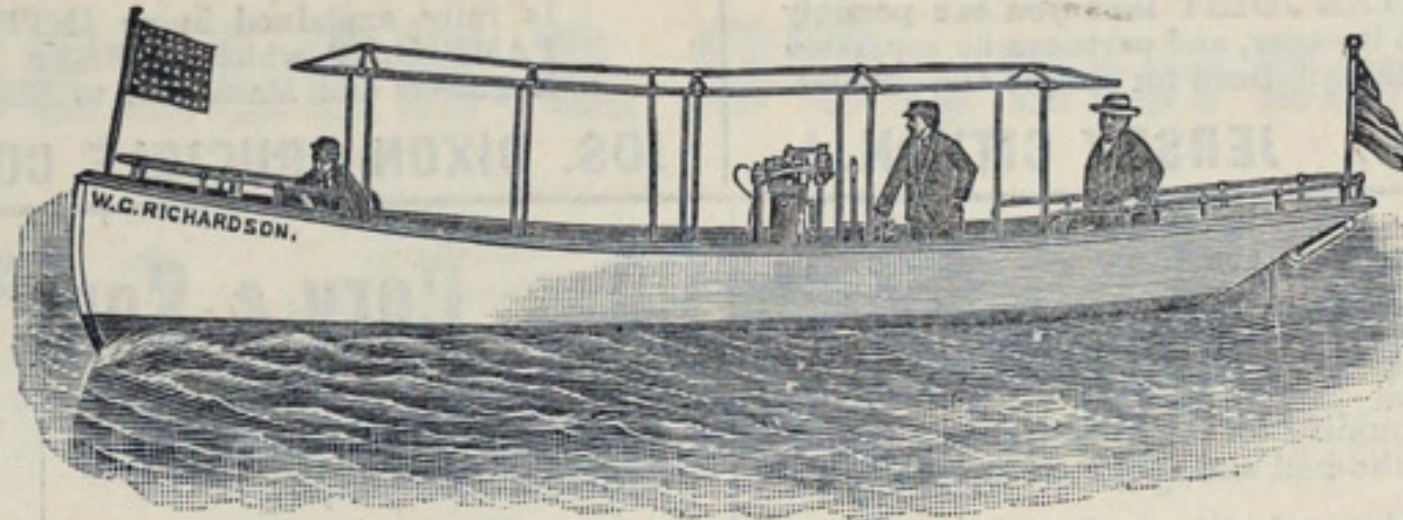


The Wootters Gas Engine.

Especially adapted for launches and ferry boats. Fitted with friction clutch or reversible shaft.

These engines are giving entire satisfaction in the pleasure yacht W. C. Richardson and the delivery launch Lotta.

Prices and particulars furnished on application.



NAPHTHA LAUNCH W. C. RICHARDSON, (Engine 8 horse power—speed 8 miles an hour.)

BUILT BY THE McMYLER MFG. CO., GAS ENGINE DEPARTMENT, 180 Columbus St., CLEVELAND, O.

Suitable for all purposes requiring from 1 to 200 horse-power, with the lowest possible expenditure.

Engines of the stationary type built for every purpose where a reliable and efficient power is required.

THE Swain Wrecking Co.
E.M. PECK, Pres.

The TUG FAVORITE
STATIONED AT CHEBOYGAN, MICH.
WITH COMPLETE WRECKING OUTFIT
IN CHARGE OF
Capt. P. L. Millen
CANADIAN WRECKER SAGINAW
STATIONED AT DETROIT, MICH.
ENABLES US TO WRECK IN CANADIAN WATERS
STEAM PUMPS AND SUB-MARINE
WORK IN CHARGE OF
JOHN S. QUINN
AGENTS AT CHEBOYGAN, MICH.

PARKER & MILLEN
OFFICE 15 ATWATER ST. WEST
DETROIT, MICH.

4 STEAM PUMPS, 10 JACKS, 3 HAWSEERS.
1 COAL AND ORE PUMP
3-12 INCH ROTARY.
1-14 INCH WORTHINGTON.
10-100 TON JACKS
1-12 INCH HAWSER.
1-10
1-9

DIVING RIGS
AND
DIVERS
ABOARD
AT
ALL TIMES

TELEGRAPH
PARKER & MILLEN,
DETROIT, MICH.

Capt. P. L. Millen
CHEBOYGAN, MICH.

**STANDARD AUTOMATIC
RELEASING HOOK**

For NAPHTHA LAUNCHES and boats
of all sizes and descriptions.

Will release a boat immediately in the roughest sea or under speed and can be hooked on without delay or injury to the hands of men hooking it on. For further information apply to

STAND'T AUT. RELEAS'G HOOK CO.,
22 and 24 State Street, New York.

KATZENSTEIN'S Self-Acting METAL PACKING,

For PISTON RODS, VALVE STEMS, etc., of every description, for Steam Engines, Pumps, etc., etc.

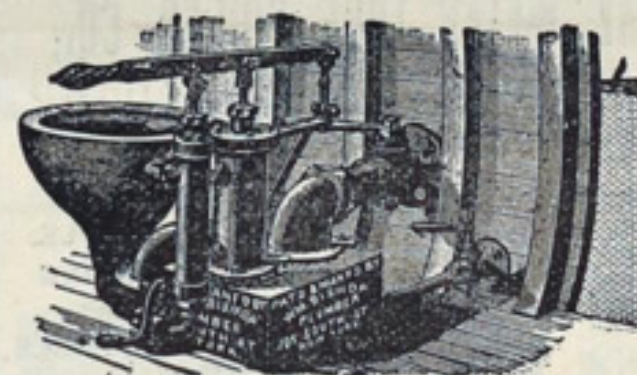
Adopted and in use by the principal Iron Works and Steamship Companies, within the last twelve years, in this and foreign countries.

FLEXIBLE TUBULAR METALLIC PACKING, for slip-joints on Steam Pipes, and for Hydraulic Pressure; also METAL GASKETS for all kinds of flanges and joints.

DOUBLE-ACTING BALANCED WATER-TIGHT BULKHEAD DOORS for Steamers. Also Agents for the McColl-Cumming PATENT LIQUID RUDDER BRAKE. For full particulars and reference, address:

L. KATZENSTEIN & CO.,
General Machinists, Brass Finishers, Engineers' Supplies,
357 West St., New York.

PATENT PUMP WATER CLOSET.



For Yachts, Naval Ships, Etc.

WM. BISHOP'S SONS,
PLUMBING and
STEAM FITTING

"MARINE SPECIALTIES."

Patentees and Manufacturers of the only Pump Water Closet that is safe below water line.

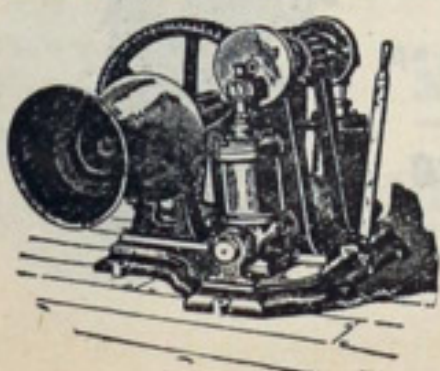
**BRASS AND COPPER PUMPS,
LAVATORIES, ETC.**

205 South St., - New York.
724 Third Ave., Brooklyn, N.Y.
Telephone.

Ship Lamps
OIL AND ELECTRIC FIXTURES
— FOR —
Steamships, Yachts, &c.
GREAT VARIETY OF DESIGNS.
Prices and Cuts on Application.

PAGE BROS. & CO.

347 to 357 Cambridge St. Boston, Mass.



Hoisting Engines.

We build them in all sizes from new and improved designs. Every engine thoroughly tested before leaving our shop, and guaranteed to be satisfactory in every case. When in want of a Hoist for marine work, dock work, mining or any other purpose, kindly permit us to name you prices. We know we can please you.

Marine Iron Co., Bay City, Michigan.

MIERS CORYELL
21 E. 21st Street, NEW YORK.

Consulting Mechanical Engineer,
Plans, Specifications and Superintendence. Marine and Water Works Engines and Boilers.



'96 JENKINS '96

Is the Perfection of Joint Packing, Instantaneous, Does not Squeeze out and not necessary to follow up joint. We guarantee it to last for years on any and all pressures of steam or any kind of joint where packing is required. Does not rot, burn or blow out, therefore the best for all purposes. Call for and insist on having '96 JENKINS '96 stamped like cut.

JENKINS BROS. New York, Boston, Philadelphia, Chicago.

C. H. McCUTCHEON,
(Successor to SAMUEL McCUTCHEON.)

Copper, Tin and Sheet Iron Manufactory,
Steamboat and Engineers' Supplies.

All kinds of Brass Cocks, Globe Valves and Couplings, &c. Iron Pipe and Fittings, and Mill Supplies. Rubber Belting, Hose and Packings, Springs, Valves, &c., Leather Belting and Usudurian Packing.

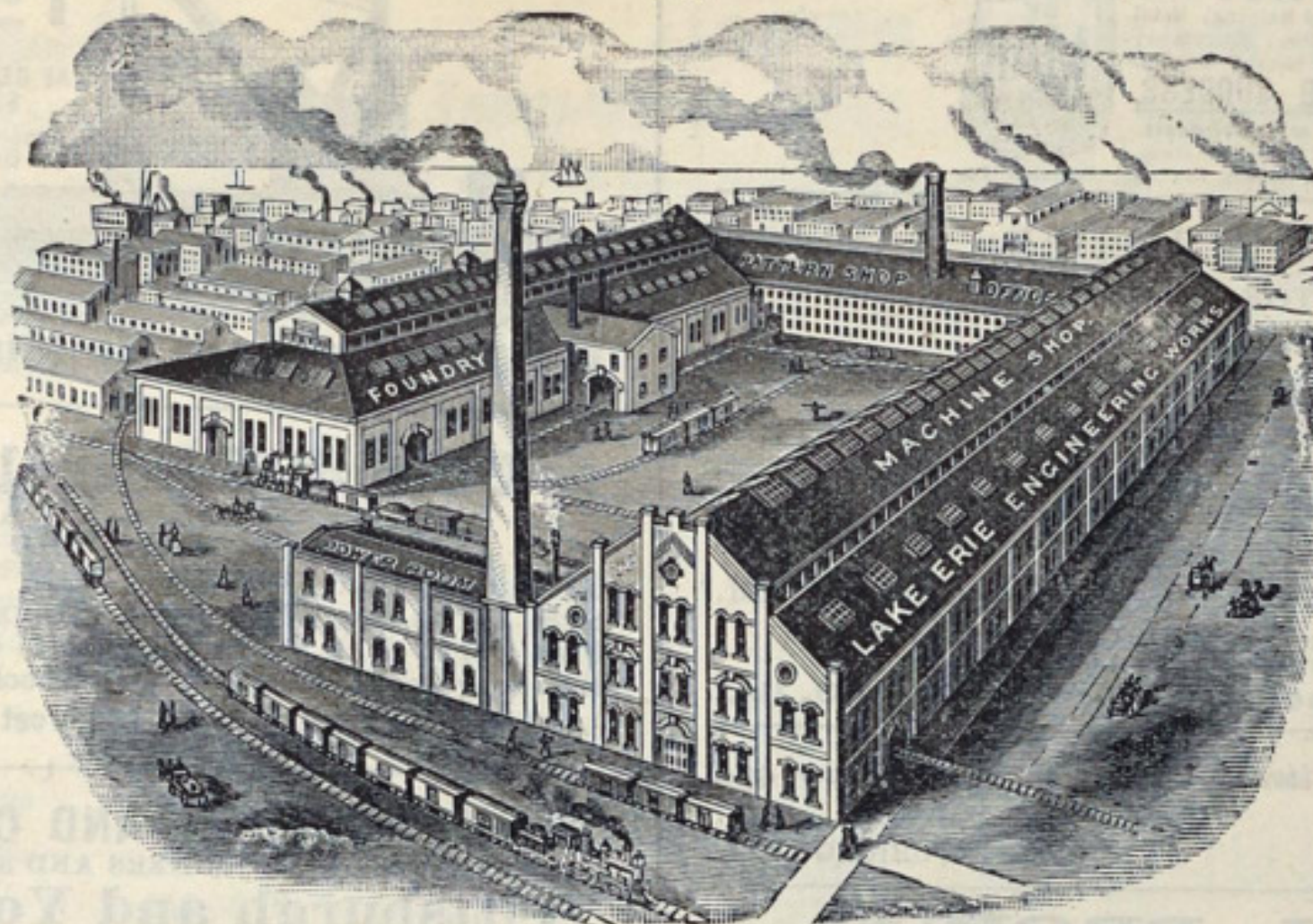
Telephone No. 68.

No. 18 Ohio Street, BUFFALO, N. Y.

Lake Erie Engineering Works, Buffalo, N. Y.

RICHARD HAMMOND, Pres't.

JOHN COON, Sec'y and Treas.



Steam Engines,
Compound, Triple
and Quadruple
Engines,
From 250 to 10,000
Horse Power
For Marine and
Stationary
Service.

Special Designs
for Cable
Railways and
Electric Power
Plants.

The Best Economy
and Regulation
Guaranteed.

THE BEST EQUIPPED PLANT IN AMERICA.



1897 Blue Book of American Shipping.

"IS THE BEST BOOK OF THE KIND EVER PUBLISHED,"

at least that seems to be the almost universal verdict of purchasers and advertisers.

"A Book that 'all hands' needs."—Marine Journal, New York, N. Y.

"Is to American shipping what Lloyd's Register is to British shipping"—Cleveland Leader.

"The field has been extended to cover the entire American marine."—Lake Marine News Press Despatches.

"The book is particularly valuable for the names which it presents of ship and engine builders; vessel owners having fleets; purchasing agents of principal passenger and freight steamer lines, etc."—Iron Age, New York.

"One list of 500 names and addresses includes owners of 2,400 of the largest vessels in the United States"—American Shipbuilder.

In a letter enclosing a check for three copies, the director of the Bureau of American Republics, Washington, says: "It is interesting to all the trade interests of the country, and must be invaluable to the shipping interests."

Order a copy, Price \$5, and if you are not satisfied with the book we will pay express both ways and credit the \$5.

BLUE BOOK OF AMERICAN SHIPPING, 409 Perry-Payne Bldg., CLEVELAND, O.

The Coast Line to MACKINAC



TO MACKINAC
DETROIT
PETOSKEY
CHICAGO

New Steel Passenger Steamers

The Greatest Perfection yet attained in
Boat Construction—Luxurious Equipment,
Artistic Furnishing, Decoration and Efficient
Service, insuring the highest degree of
COMFORT, SPEED AND SAFETY

FOUR TRIPS PER WEEK BETWEEN

Toledo, Detroit and Mackinac

PETOSKEY, "THE SOO," MARQUETTE
AND DULUTH.

LOW RATES to Picturesque Mackinac and
Return, including Meals and Berths. From
Cleveland, \$18; from Toledo, \$15; from
Detroit, \$13.50.

DAY AND NIGHT SERVICE.

Between Detroit and Cleveland

Connecting at Cleveland with Earliest
Trains for all points East, South and South-
west and at Detroit for all points North and
Northwest.

Sunday Trips June, July, August and Sept. Only

EVERY DAY BETWEEN

Cleveland, Put-in-Bay, Toledo

Send for Illustrated Pamphlet. Address

A. A. SCHANTZ, G. P. A., DETROIT, MICH.

The Detroit & Cleveland Steam Nav. Co.

\$2.50 CLEVELAND
To BUFFALO

ALSO DAILY LINE
BETWEEN

CLEVELAND AND TOLEDO.

Via "C. & B. LINE."

Steamers "City of Buffalo," (new)
"State of Ohio" and "State of New York"

DAILY TIME TABLE.

Sunday Included May 30 to October 3.

Lv. Cleveland 7:00 P.M. | Lv. Buffalo 7:30 P.M.
Ar. Buffalo 7:30 A.M. | Ar. Cleveland 7:30 A.M.

CENTRAL STANDARD TIME.

Take the "C. & B. Line" steamers and
enjoy a refreshing night's rest when enroute
to Buffalo, Niagara Falls, Toronto, New
York, Boston, Albany, 1,000 Islands, or
any Eastern or Canadian Point.

Cheap Excursions Weekly to Niagara Falls.

Send 4 cents postage for tourist pamphlet.
For further information ask your nearest
Coupon Ticket Agent or address,

W. F. HERMAN, T. F. NEWMAN,
GEN'L PASS. AGT. GEN'L MANAGER,
CLEVELAND, O.

APPOINTMENTS of Captains and En-
gineers for 1897.

The most complete published. Arranged
for reference by fleet and by vessels with
names alphabetically arranged.

Necessary to everyone who has business
with captains or engineers.

PRICE \$1.00.

MARINE REVIEW,

409 Perry-Payne Bldg.,

Cleveland, O.



YOU ARE A
BACK NUMBER

If you don't know how to use an INDI-
CATOR, or carry in your closet some
EUREKA. Send for our catalog and
easy terms of payment for INDICATOR.

JAS. L. ROBERTSON & SON,
204 Fulton St., N.Y. 12 Pearl St., Boston



EVERY MARINE ENGINEER
on the Lakes, and every second
who is studying for first class
papers, ought to possess

Reed's Engineers' Hand Book

(Fifteenth Edition.)

Containing 600 engravings and a
portfolio of drawings of all parts
of marine engines.

It has always sold for \$4.50 and
\$5. Until Dec. 1 any subscriber to
the REVIEW may have a copy
sent post paid by enclosing this
advertisement and \$4 to

Marine Review,

BOOK DEPT.

409 Perry-Payne Bldg., CLEVELAND, O.

STEAM ENGINEERING

(Stationary, Locomotive, Marine); Mechanical Drawing; Architectural Drawing; Machine Design; Electricity; Architecture; Plumbing; Railroad, Municipal, **31 COURSES** Hydraulic Engineering; Surveying and Mapping; Metal Pattern Cutting; Bookkeeping; Shorthand; English Branches; Mining; Metal Prospecting. **TAUGHT BY MAIL** **THOROUGH PRACTICAL**
GUARANTEED SUCCESS.
 All who study
 Fees Moderate, Advance or Installments.
 Circular Free; State subject you wish to study.
 International Correspondence Schools, Box 965, Scranton, Pa.

HARVEY D. GOULDER,
 LAWYER AND PROCTOR IN ADMIRALTY,
 CLEVELAND, O.

ALBERT J. GILCHRIST, PROCTOR IN ADMIRALTY,
 No. 604 PERRY-PAYNE BLDG., CLEVELAND, OHIO.

AMBROSE V. POWELL, C.E., * * Consulting Engineer.
 Specialties: Designing and Construction of DRY DOCKS, Harbor Works, Docks and Plants for Handling Coal and Ore.
 Office, 507 Chamber of Commerce, CHICAGO, ILL.

C. E. KREMER, Attorney and Counselor-at-Law and Proctor in Admiralty.
 Rooms 14, 15 and 16, Bryan Block, 164 LA SALLE ST., CHICAGO, ILL.

HARVEY L. BROWN,
 Counselor at Law and Proctor in Admiralty,
 35 White Building, BUFFALO, N. Y.

HAWGOOD & MOORE W. A. HAWGOOD, J. W. MOORE.
 Vessel and Insurance Agents,
 Residence Phone, Doan 446—W. A. Hawgood.
 Long Distance Tel. 2395. 608 Perry-Payne Bldg., CLEVELAND, O.

W. C. RICHARDSON,
 VESSEL AND MARINE INSURANCE AGENT.
 Office Telephone 338. Nos. 606 & 607 Perry-Payne Bldg., Cleveland, O.
 Residence Telephone 2938.

J. H. BARTOW, TELEPHONE 717.
 Vessel and Insurance Agent,
 611 and 612 Perry-Payne Bldg., Cleveland, O.

JOHN MITCHELL, JOHN F. WEDOW, ALFRED MITCHELL.
MITCHELL & CO.,
 Vessel and Insurance Agents,
 508, 509 and 510 Perry-Payne Building, CLEVELAND, OHIO
 Office Telephone, 737. Residence, John Mitchell, 3506.

C. R. JONES & CO., VESSEL AGENTS,
 FIRE AND MARINE INSURANCE.
 Nos. 501, 502 and 503 Perry-Payne Bldg., CLEVELAND, O.

THOS. WILSON,
 MANAGING OWNER
WILSON'S TRANSIT LINE.
 Gen. Forwarder.
 Freight and Vessel Agent.
 CLEVELAND, O.

J. T. ROSE, FRANK B. LAZIER.
ROSE & LAZIER,
 Vessel Agents and Brokers,
 and Marine Insurance,
 16 Board of Trade,
 DULUTH, MINN.

PATENTS

QUICKLY SECURED. Trade-marks and Copyrights registered and patent business of every description promptly and skillfully conducted at lowest rates. Inventions introduced, companies formed, and PATENTS SOLD ON COMMISSION. 25 years' experience. Highest references. Send us model, sketch or Photo. of invention, with explanation, and we will report whether patentable or not, free of charge. OUR FEE PAYABLE WHEN PATENT IS ALLOWED. When patent is secured, we will conduct its sale for you without extra charge. 32-PAGE HAND-BOOK and list of 200 inventions wanted mailed to inventors free upon request. This is the most complete little patent book published and every inventor should WRITE FOR ONE.
H. B. WILLSON & CO., Patent Solicitors,
 Le Droit Bldg., WASHINGTON, D. C.

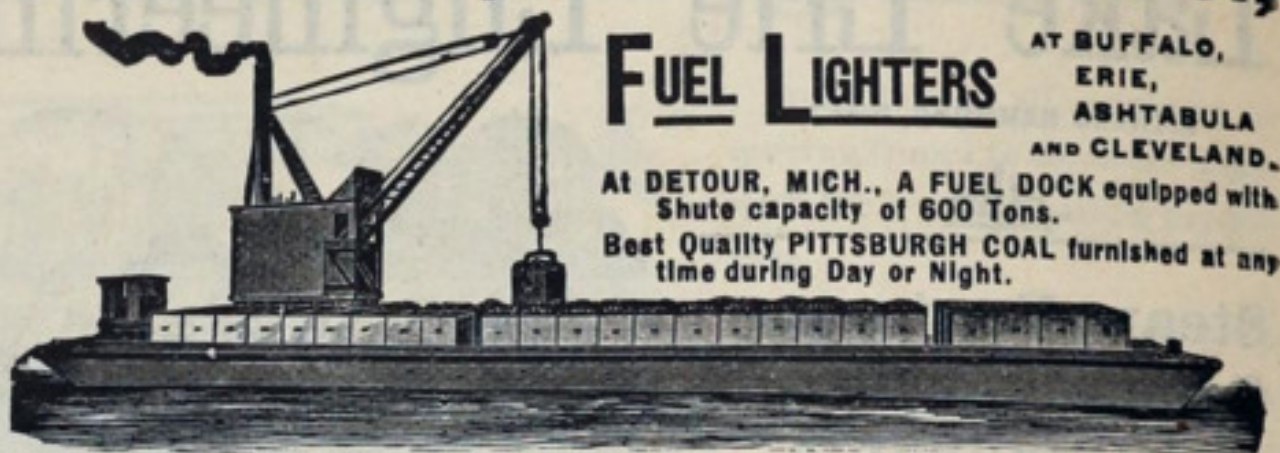
PALMER & CO.,
 VESSEL AGENTS
 AND UNDERWRITERS,
 713 Perry-Payne Bldg., Cleveland, Ohio.
 Telephone 644.

J. J. H. Brown, Edward Smith, J. B. Rodgers.
BROWN & CO.,
 Vessel and Insurance Agents,
 202 Main St.,
 BUFFALO, N. Y.

White, Johnson & McCaslin,
 ATTORNEYS-AT-LAW,
 —AND—
 Proctors in Admiralty,
 26-27 Blackstone Building,
 CLEVELAND, OHIO.

ORESTES C. PINNEY,
 Lawyer and Proctor in Admiralty.
 Rooms 722 and 723 Perry-Payne Bldg.
 CLEVELAND, OHIO.
 Telephone 2585.

C. W. ELPHICKE, JAS. A. MYERS, CALVIN CARR.
C. W. ELPHICKE & CO.
 GENERAL INSURANCE AGENTS,
 Room 10, No. 6 Sherman St., Chicago, Ill.

Pickands, Mather & Co.,

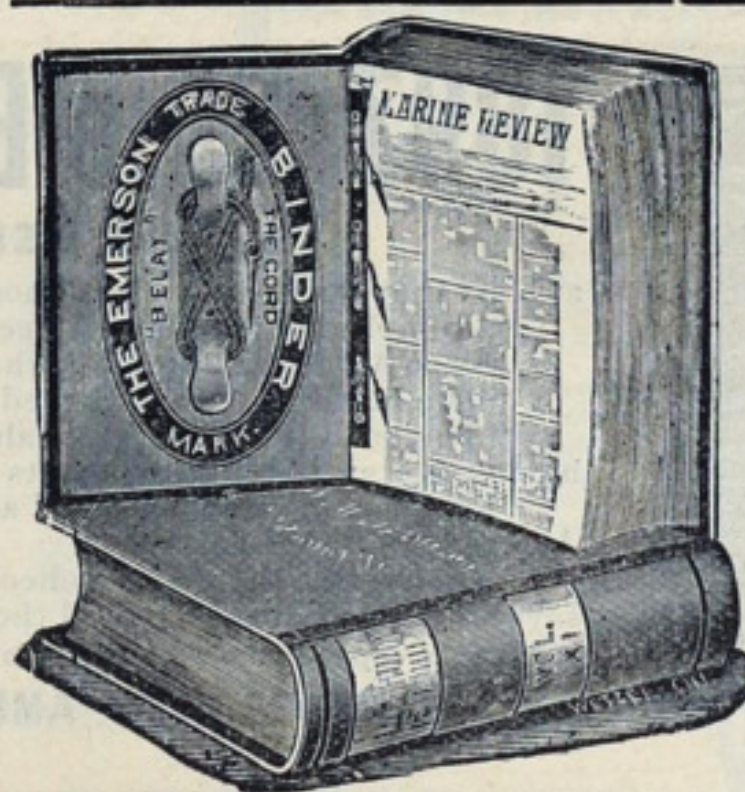
Western Reserve Building, CLEVELAND, O.

Ohio & Pennsylvania Coal Co.

FUEL DEPARTMENT.
MINERS AND SHIPPERS,
 Youghiogeny and Ohio Steam Coals. Steamboats, Tugs, etc., Coaled day or night, DOCKS FOOT WEST RIVER STREET. WHISKEY ISLAND GOVERNMENT PIER and C. & P. R. R. SLIPS. Also STEAM LIGHTER—Equipped with Revolving Derrick and (100) two ton buckets.
 Telephone 1608. Office, 130 West River St., CLEVELAND, OHIO.

THE PITTSBURGH AND CHICAGO GAS COAL CO.

MINERS AND SHIPPERS OF
Pittsburgh and Youghiogeny Coal.
 Fuel Docks West Side of Main River, Cleveland, Ohio, just above Main St. Bridge. Latest equipment for rapid fueling of Steamers at all hours, day or night. Fuel Lighter 300 tons capacity; buckets 2½ tons capacity.
 Telephone { Office 1888.
 { Fuel Dock 1590.
 { Ore Dock, 2413. J. A. DONALDSON, Agent,
 420-421 Perry-Payne Building.



ONE OF THESE BINDERS
 that will hold 52
NUMBERS
 of the

MARINE REVIEW,

Will be mailed to
 any address on
 receipt of \$1.

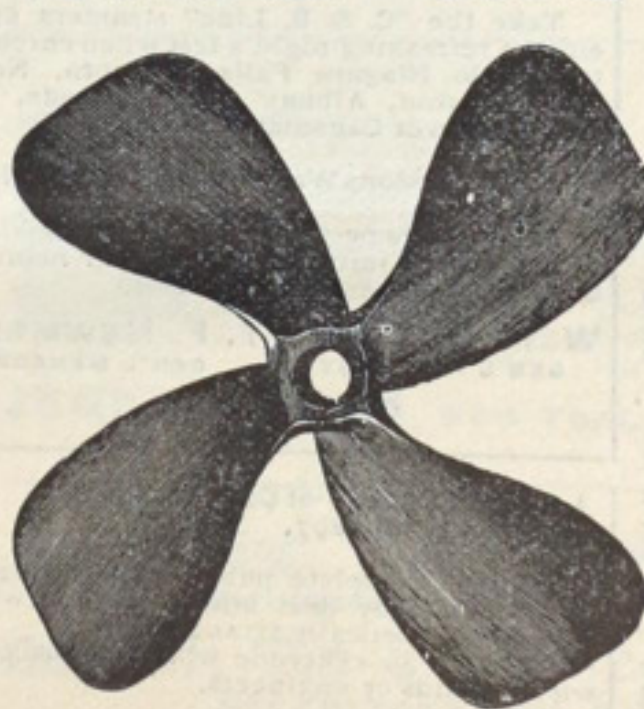
MARINE REVIEW...
 409 Perry-Payne Bldg.,
 CLEVELAND, O.

H. A. BARR, PRESIDENT, F. H. VAN CLEVE, SEC. CAPT. GEO. BARTLEY, SUPT.
 Escanaba, Escanaba, Escanaba, Mich.

ESCANABA TOWING & WRECKING CO., Escanaba, Mich.

Tugs, Lighters, Steam Pumps, Hawseers, Hydraulic Jacks and Diving Appliances always ready.
TUG MONARCH, Engine Compound, Cylinder 16 and 30 inches diameter, 30 inch Stroke, Steam Pressure Allowed, 125 pounds.
TUG DELTA, Cylinder 20 by 22, Steam Pressure Allowed, 105 pounds.
TUG OWEN, Cylinder 20 by 20, Steam Pressure Allowed, 104 pounds.

CENTRIFUGAL PUMPS, Seven and Fourteen Inch Suction

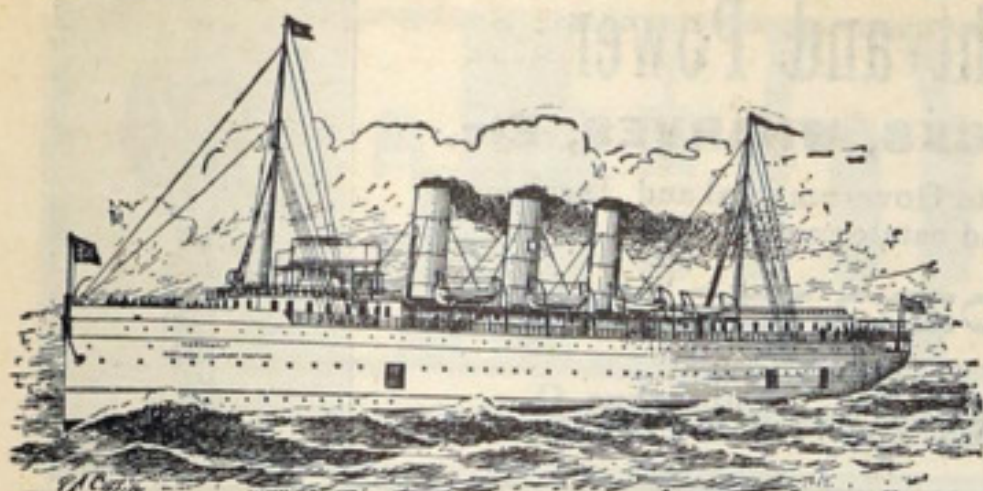
H. G. TROUT, KING IRON WORKS,

BUFFALO, N. Y.
 MANUFACTURERS OF
**TRIPLE EXPANSION,
 THREE CYLINDER,
 FORE AND AFT
 And STEEPLE COMPOUND
 MARINE ENGINES,**

High and Low Pressure Engines,
 Sectional Propeller,
 Tug and Yacht Wheels,
 Cowles Aluminum and Manganese
 Bronze Propeller Wheels.

These Wheels are noted for their extra speed, towing power and proportionate saving of coal.

PRICES QUOTED ON APPLICATION.



Shippers of Coal by Rail and Water.

RAPID FUELING DOCKS, DETROIT RIVER.**JAMES GRAHAM & CO.,**

Foot Twenty-first St., Detroit,

Below Routes of Passenger and Car Ferry Lines.

Pockets and Chutes arranged for different types of vessels.

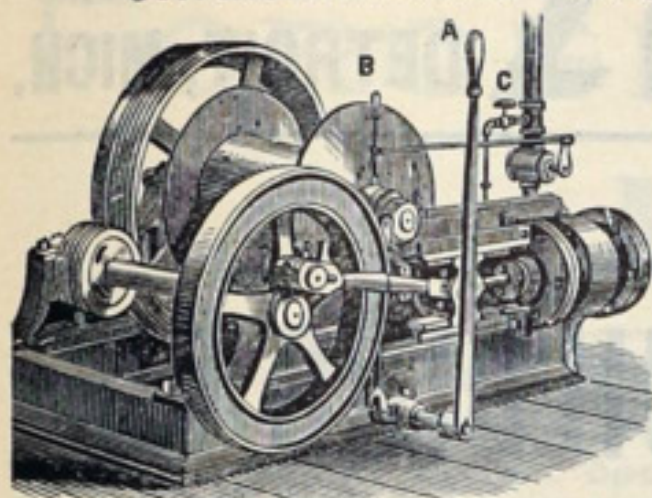
BEST STEAM COAL.

Large Supplies and every effort to give dispatch, day and night. Wide stretch of river for tows, and plenty of water at dock at all times.

Office 1005 Chamber of Commerce. Phone 2083.

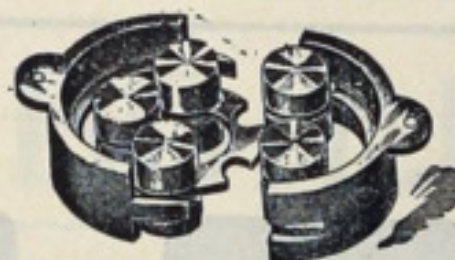
WILLIAMSON BROS.

Cor. Richmond and York Sts., PHILADELPHIA, PA.

**Hoisting Engines and Ship Steering Engines.**

With either Frictional, Spur or Worm Gear of various Patterns to suit all purposes.

Over 150 of the largest and most modern lake steamers have our steerers.

FERRALL'S PATENT**Long Bearing Self-Adjusting 5 Roll Sheave**

Has no rivets in its construction, therefore is made stronger, having an interior separator to prevent the rolls from touching each other, and an interior rail to guide the rolls.

**BAGNALL-LOUD BLOCK CO.**

162 Commercial Street,

BOSTON, MASS

THE W. L. SCOTT CO.

Wholesale Dealers in

Shamokin, Wilkesbarre, and Hazleton-Lehigh

COALS.**Mansfield Steam Coal.**

FUELING VESSELS a specialty, either from dock or steam scow Mansfield, capacity 300 tons, in buckets, which gives quick dispatch. Boats coaled day or night. Docks lighted with electricity and equipped with steam derricks.

Fueling Office at Canal Dock, ERIE, PA.

The Rochester & Pittsburgh Coal & Iron Co.**REYNOLDSVILLE COAL.****Steamboat Fuel Dock.** Blackwell Canal at Michigan St. Bridge. 1400 feet dock frontage.

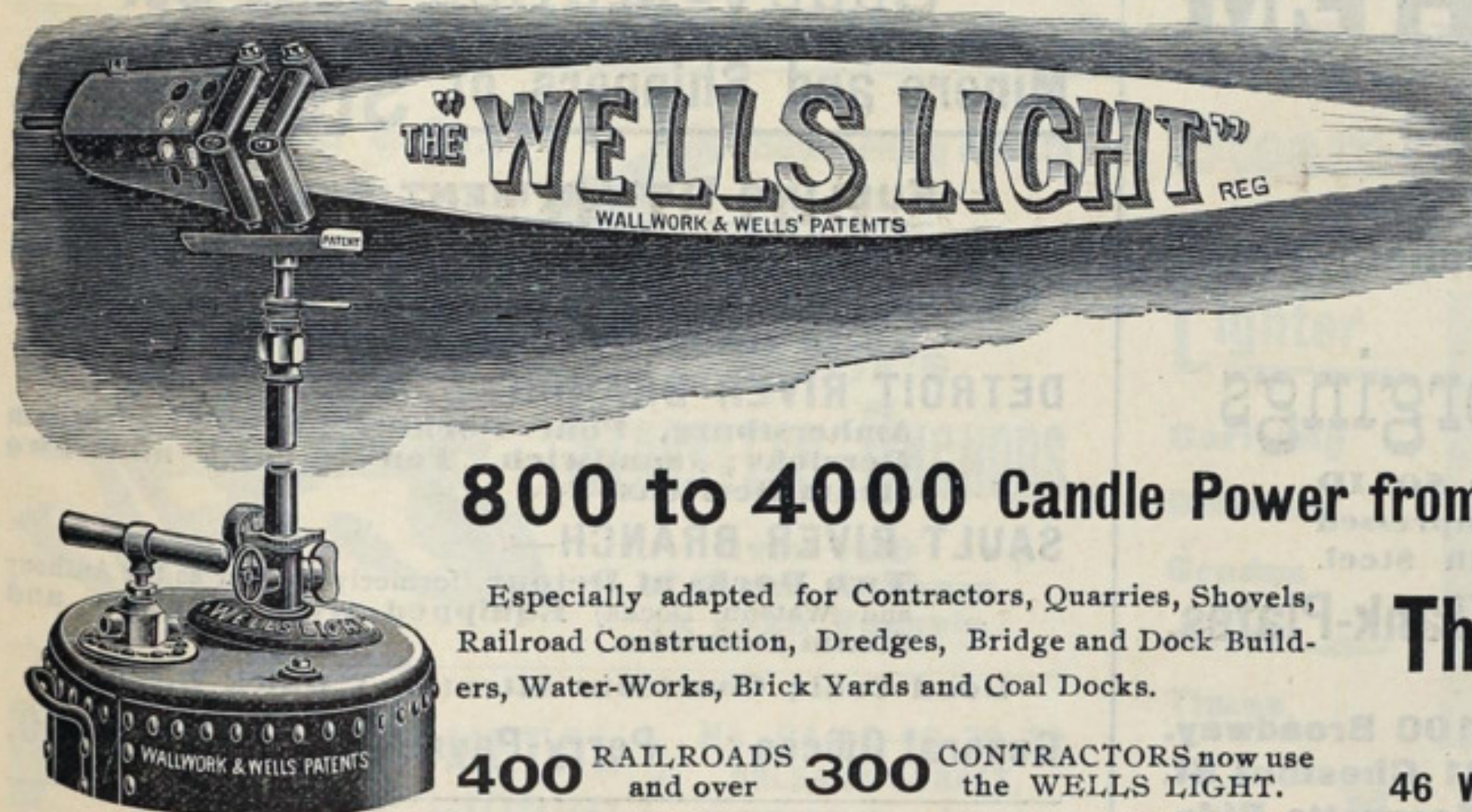
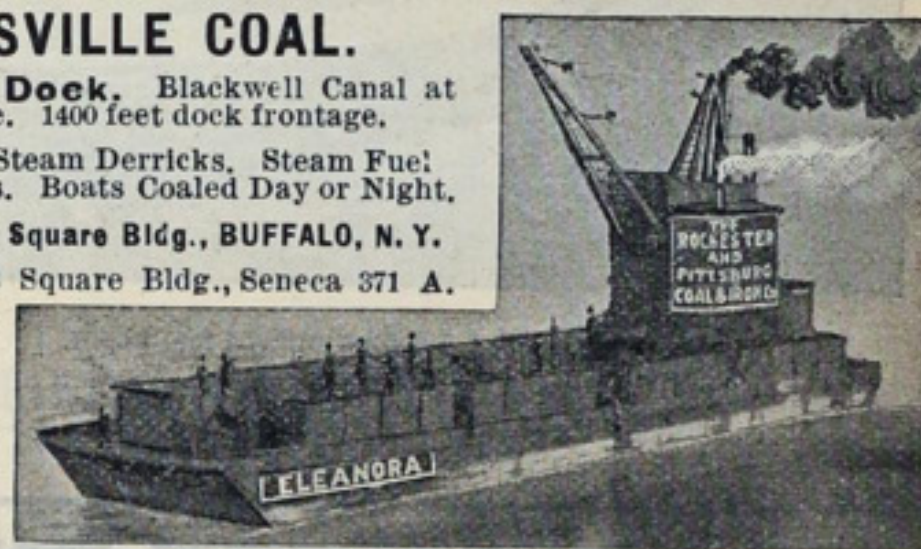
Steam Elevator and 4 Steam Derricks. Steam Fuel Scow, Capacity 550 Tons. Boats Coaled Day or Night.

OFFICE: 694 Ellicott Square Bldg., BUFFALO, N. Y.

TELEPHONES: Ellicott Square Bldg., Seneca 371 A. Dock, Seneca 371 D.

WM. H. HAZEN,

Dock Superintendent.

**10,000 IN USE.**

Unaffected by Weather.

Portable, Self Contained.

800 to 4000 Candle Power from KEROSENE OIL.**The Wells Light Mfg. Co.**

EDWARD ROBINSON, Sole Proprietor.

46 Washington Street,

NEW YORK.

MARINE VALVE OIL FOR INTERNAL LUBRICATION.**RENOWN ENGINE OIL** FOR EXTERNAL LUBRICATION.

Marine Valve, Renown Engine,

Eldorado Engine, Crank Case,

Victor Signal, Dark Lubricating,

Mineral Seal, Head Light,

Artic Cup Greases, and Lard Oils.

— CARRIED IN STOCK AT THE —

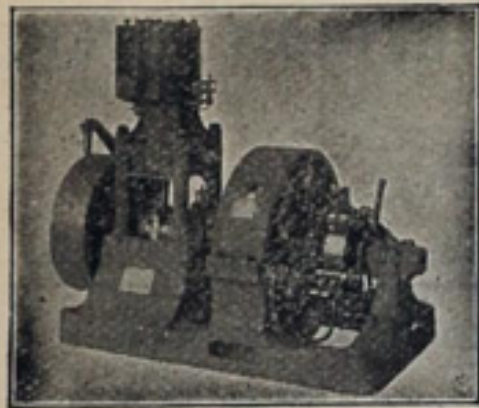
STANDARD OIL COMPANY'S MARINE DEPOT,

TELEPHONE 77.

123 River Street, CLEVELAND, O.

MAIN OFFICE TELEPHONE 682.

ALSO FOR SALE BY
STANDARD OIL COMPANY,Chicago, Ill., No. 5 Wabash Ave.
Racine, Wis.
Milwaukee, Wis., Broadway & Mason.
Sheboygan, Wis.
Manitowoc, Wis.
Green Bay, Wis.Marinette, Wis.
Oshkosh, Wis.
Duluth, Minn.
West Superior, Wis.
Hancock, Mich.
Marquette, Mich.Buffalo, N. Y.
Sault Ste. Marie, Mich.
West Bay City, Mich., M.C. Ry. & 10th St.
Saginaw, Mich., Eighth & Sears Sts.
Detroit, Mich., 46 Jefferson.
Toledo, O., Summit & Monroe Sts.A. H. MCGONAGIL, South Chicago, Ill.
MARINE SUPPLY Co., Fairport, O.
F. KRANZ, Sandusky, O.
THE M. I. WILCOX CORDAGE & SUPPLY Co., Toledo OATLANTIC REFINING COMPANY, French & 16th Sts., Erie, Pa.
D. ROBESON, Port Huron, Mich.
W. S. MCKINNON, Ashtabula Harbor, O.
HULL & RAND, Huron, O.EDWARD BRAMMALL, Bnton Harbor, Mich.
BABY & DALE, St. Clair, Mich.
N. C. ALTEN, Lorain, O.
A. F. HARRINGTON, Conneaut Harbor, O.



Complete Electric Plants for Light and Power

On **STEAMSHIPS, WHALEBACKS, YACHTS, DOCKS, WHARVES, Etc.**

Our system is complete in every detail. All our appliances are made to Governmental and Insurance requirements and are perfect. Write for prices and catalogues.

General Electric Company.

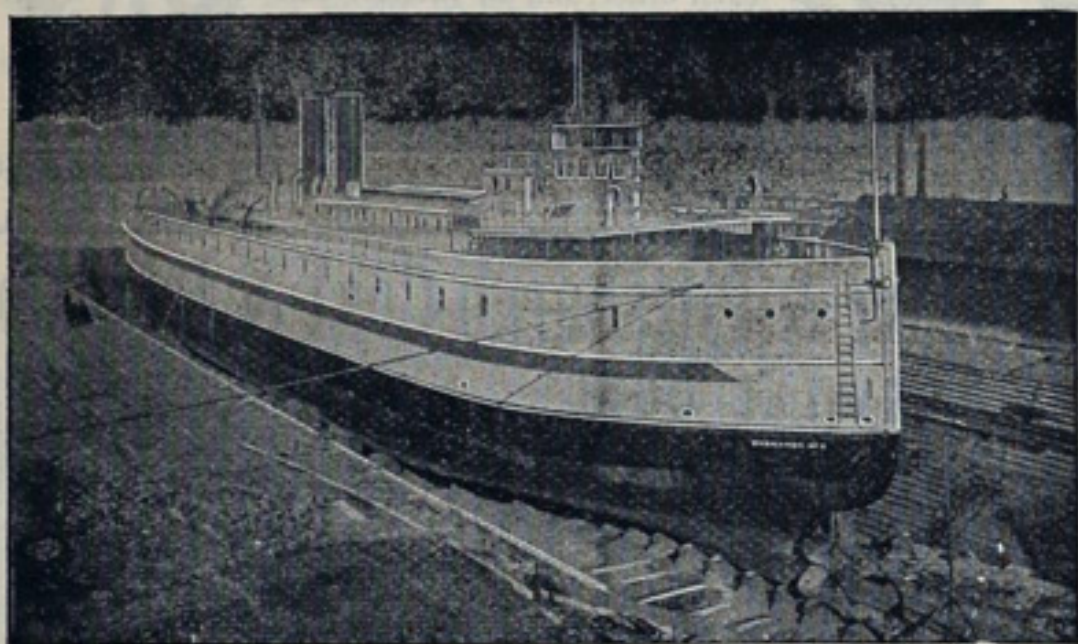
SALES OFFICES

Schenectady, N. Y. Chicago, Ill. Detroit, Mich. Buffalo, N. Y. Columbus, O.
Boston, Mass. Philadelphia, Pa. Baltimore, Md. Portland, Ore. San Francisco, Cal.
New York, N. Y. New Orleans, La.



FRONTIER IRON WORKS

MARINE ENGINES, DETROIT, MICH.



Shenango No. 2, 300 feet long, 54 feet beam.

CRAIG SHIP BUILDING CO.

TOLEDO, OHIO,
METAL AND WOODEN SHIP BUILDERS.

New Dry Dock—450 feet long, 110 feet wide on top,
55 feet wide on bottom, 16 feet of Water on Sill.

Repairs to Metal and Wooden Ships
A SPECIALTY.

THE BETHLEHEM IRON CO.

Works & Principal Office, South Bethlehem, Penn.

Marine Engine Forgings

of all descriptions, made either **SOLID**
or **HOLLOW** from Fluid-Compressed
Hydraulic-Forged Open Hearth Steel.

Ship-Plates. Boiler-Plates. Tank-Plates.

NEW YORK OFFICE, - - 100 Broadway.
PHILADELPHIA OFFICE, - - 421 Chestnut St.
CHICAGO OFFICE, - - Marquette Bldg.

The United States Standard Register of Shipping.

Providing the only Standard Classification based on Construction Rules
Designed for Lake Vessels.
Classed Vessels Receive the Lowest Rates of Insurance.

SURVEYORS.

SINCLAIR STUART, Surveyor of Iron and Steel Construction and Engineer
Surveyor for District comprising Lakes Superior, Michigan and Huron and Lake Erie, as far East
as, and including Cleveland, O.

EDWARD CASKIN, Potter Building, Main Street, Buffalo, N. Y., Surveyor for
District comprising Lake Ontario and Lake Erie, as far West as, but not including
Cleveland, O.

Application for survey of vessels and subscriptions to Register Book will be received
by the surveyors or at the office of

The United States Standard Steamship Owners', Builders' & Underwriters' Ass'n, Ltd.
Post Building, 16 and 18 Exchange Place, NEW YORK.

Cuddy-Mullen Coal Co.

Miners and Shippers of Steam Coal

FUELING DEPARTMENT FACILITIES:

CLEVELAND HARBOR—

Car Dumper; Eight Pockets 1,000 tons capacity;
Three Steam Derricks; Lighter.

DETROIT RIVER BRANCH—

Amherstburg, Four Pockets and Three Steam
Derricks; Sandwich, Ten Pockets and Two
Steam Derricks.

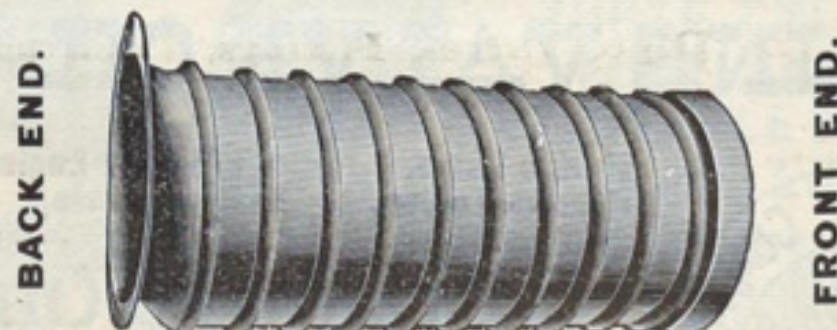
SAULT RIVER BRANCH—

Two Docks at Detour (formerly known as the Anthony
and Watson Docks) Equipped with Pockets and
Steam Derricks.

Good Coal; Courteous Attention; Quick Dispatch.

General Offices: Perry-Payne Bldg., Cleveland, O.

PURVES' RIBBED STEEL BOILER FURNACE FLUE.



With this style of Furnace Flue, the rivets at the "back end" are out of the line of fire, and all that has to be done to remove it is to cut out the rivets at the ends and slip it through the front; and to replace it, simply to slip it back in its place and rivet up the ends again without disturbing any other part of the boiler. No smith work is required to fit it in a boiler or to refit it when replaced. It is ready for use as it comes from the manufacturers. This style of Flue has been in use six years without a single complaint.

Over 16,000 of Purves' Ribbed Steel Furnace Flues in successful use in Marine Boilers.
ELLIS & EAVES SYSTEM OF INDUCED OR SUCTION DRAFT.

CHARLES W. WHITNEY,

Sole Agent for the United States and Canada,
Bowling Green Building, 5 to 11 Broadway, New York City.

S. F. HODGE & CO.

MARINE ENGINES,
PROPELLER WHEELS,
DECK HOISTERS,
MARINE REPAIRS.
320 ATWATER STREET,
DETROIT, MICH.

THE BABCOCK & WILCOX CO.

29 CORTLAND STREET,
NEW YORK.

FORGED STEEL WATER-TUBE MARINE BOILER,

Light, durable, easily cleaned and inspected. Only straight tubes are used.
The largest cargoes on the Lakes are carried by steamers using BABCOCK & WILCOX boilers.
The fastest of the six composite Gunboats recently constructed for the U. S. N. (MARIETTA and ANNAPOLIS) are equipped with these boilers.
Boilers also ordered for U. S. N. CHICAGO and ATLANTA.

BAR IRON THE BOURNE-FULLER CO. PIG IRON CLEVELAND, O.

SHIP PLATES, BOILER PLATES,
ANGLES, BEAMS, CHANNELS, BARS,
BOAT SPIKES, CLINCH RINGS,

SALES AGENTS:

THE CAMBRIA IRON CO.

— Mfrs. of Open Hearth and Bessemer Steel. —

De Grauw, Aymar & Co.,
34-35 South Street,
NEW YORK, N. Y.



Sole Selling Agents
in the
United States
for

TYZACK'S STOCKLESS ANCHORS

Over 100
of these Anchors
on Lake Vessels.

DETROIT SHEET METAL AND BRASS WORKS

No. 64-66-68-70-72
ORLEANS STREET,
DETROIT, MICH.

Jobbers of..... Pipe, Valves, Fittings, Packing, Oil and
Engineers Supplies.

Contractors for High Class Steam Fitting, Steam Heating,
Plumbing, Copper Work, and all
Classes of Sheet Metal Work.

Manufacturers of Clark's Patent Metallic Life Raft, Side
Lights, Marine Hardware, Hurricane,
Cabin and Platform Lamps, Trip
Gongs, etc.

Agents for..... Laidlaw - Dunn - Gordon Steam Pumps,
Warren Webster's Specialties, and
Buffalo Forge Co.'s Fans, Engines and
Heaters.

Engineers can be waited on promptly day or night.

Steamboat Fuel at Ashtabula. Large Supplies of Best Quality.

Lighter

Carrying
Different
Grades
at all
Times.



Fuel scow with elevators
and discharging spouts.
Storage of 650 tons. Dis-
charges 150 tons an hour
into steamers while un-
loading cargo.

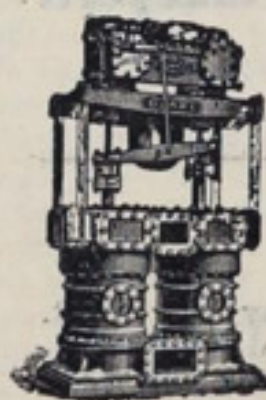
M. A. HANNA & CO.,

Main Office, Perry-Payne Bldg., Cleveland. Miners and Shippers.

THE GEO. F. BLAKE MFG. CO.

BUILDERS OF

MARINE PUMPS



AIR PUMP ON
U.S. CRUISER NEW YORK.

Single and Duplex Pumps for Boiler Feed,
Fire or Bilge Service—Vertical and Horizontal.
Vertical and Horizontal Pumps, Air Pumps
for Surface and Jet Condensers.

95 and 97 Liberty St., NEW YORK.

ECLIPSE SECTIONAL RAINBOW GASKET.

3/8-INCH FOR PIPE UNIONS.
1/2-INCH FOR HAND HOLES.



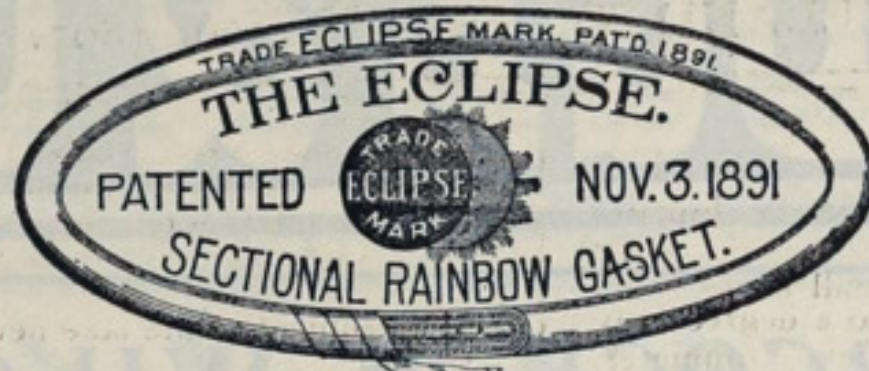
Patented and Manufactured
Exclusively by

PEERLESS RUBBER MFG. CO.,

16 Warren Street,

+ NEW YORK. +

16-24 Woodward Ave.,
DETROIT, MICH.



Facsimile of a 6-inch section of Eclipse Gasket, showing name and trade mark imbedded.

193-195 Bank St.,
CLEVELAND, O.

5/8-INCH FOR REGULAR SIZE.
3/4-INCH FOR LARGE SIZE.

MAN HOLES.



Write for Testimonials.

202-210 So. Water St.,
CHICAGO, ILL.

The Cleveland Dry Dock Co.



148 Elm St.,
Cleveland, O.
Telephone 1616.
Resid. 'Phone 3634.

REPAIRING
A SPECIALTY.

Dimensions of Dock:
Lth. over all, 360 ft.
Lth. on blocks, 340 ft.
Width of gate, 50 ft.
Depth over sill, 20 ft.

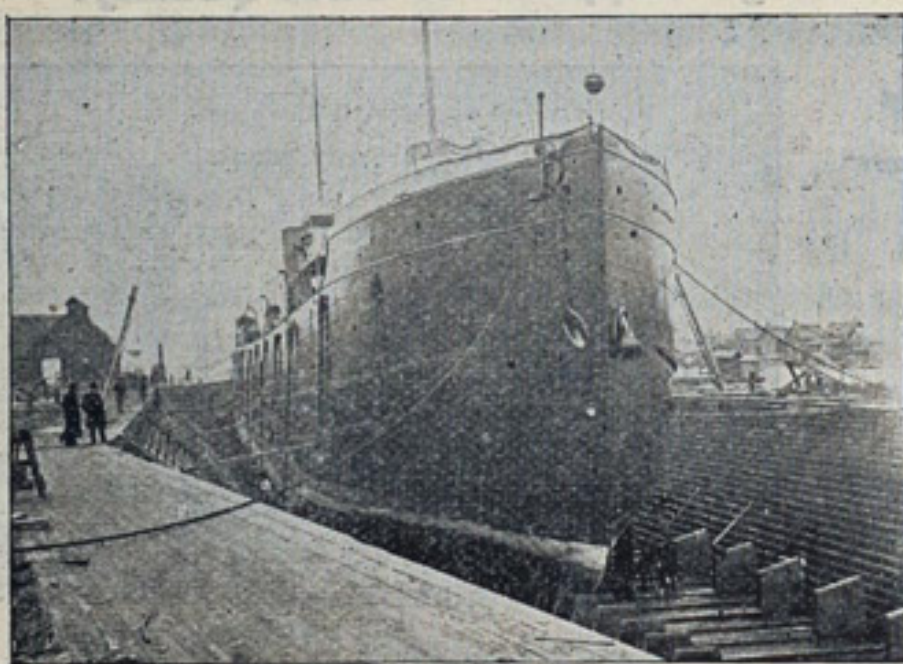
Capt. W. W. BROWN,
Sec'y & Mgr.

AMERICAN STEEL BARGE CO.

STEEL and METAL SHIPS

Of all classes built on the Shortest Possible Notice at our yards at
West Superior, Wis., and also at Everett, Wash.

Plates &
Material
Always
on hand
to Re-
pair all
kinds of
Metal
Ships in
Shortest
Time.



Best
Quality
of Oak
instock
for Re-
pairing
Wooden
Vessels
of all
Classes.

SIZE OF DOCK.

Length, extreme.....537 feet.	Entrance, Top.....55 feet 9 in
Breadth, Top 90 " 4 in.	Entrance, Bottom.....50 "
Breadth, Bottom 52 "	Depth over Sills18 "

LARGEST DRY DOCK ON THE LAKES.

Prices for Repairs and Docking same as at lower lake ports
SUPERIOR, WIS.

A number of Propeller Wheels in stock at Dry Dock.

H. C. BURRELL

MARINE REPORTER, DETROIT.

Small boat on the river at all hours of the day and night.
Let us give you prices on delivery of orders and other busi-
ness at Detroit. Engineers and firemen, mates and deck
hands, furnished on short notice.

Office Foot of Woodward Ave.

Tel. Main 46 B.

C
O
A
L



C
O
A
L

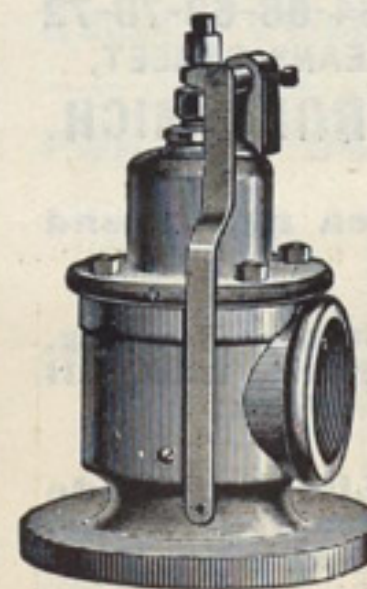
DELTA METAL



THE PHOSPHOR BRONZE SMELTING CO. LIMITED,
2200 WASHINGTON AVE., PHILADELPHIA.
"ELEPHANT BRAND PHOSPHOR-BRONZE"
INGOTS, CASTINGS, WIRE RODS, SHEETS, ETC.
— DELTA METAL —
CASTINGS, STAMPINGS AND FORGINGS.
ORIGINAL AND SOLE MAKERS IN THE U.S.

PROPELLERS.

CROSBY STEAM GAGE AND VALVE CO.



CROSBY POP SAFETY VALVES, Locomotive, Marine
and Stationery.
CROSBY WATER RELIEF VALVES, for Pumps, Hy-
drants, etc.
CROSBY IMPROVED STEAM PRESSURE GAGES.
CROSBY STEAM ENGINE INDICATORS, with Sargent's
Electrical Attachment for taking any number of Dia-
grams simultaneously.

The Original SINGLE BELL CHIME WHISTLES.
BRANDEN PUMP VALVES; rubber with wire-coil inser-
tion.
BOSWORTH FEED-WATER REGULATOR, PATENT
GAGE TESTER, and many other specialties in Steam
Lines.

Main Office and Works: Boston, Mass.

Stores: Boston, New York, Chicago, and London, Eng.

WE WILL REPAIR YOUR STEAM FITTINGS PROMPTLY.

ALL RELIABLE statistics relating to shipping are contained in
the Blue Book of American Shipping. Price, \$5. MARINE REVIEW,
Cleveland.